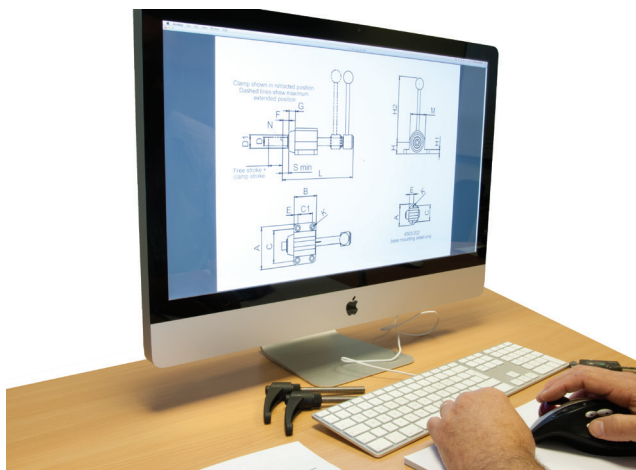


TECHNICAL ADVICE

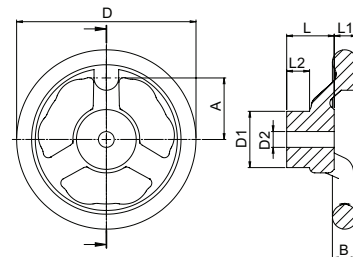
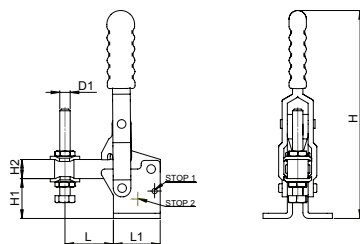
Not sure whether a product is right for your application? Need some advice before making your purchase? WDS offer comprehensive pre- and post-sales technical support, our technical service department are our engineers and designers. With many years of experience they will gladly help and advise you.

Technical Support Line: 0113 290 5822

2D AND 3D CAD



The range of 15,000+ products available from WDS is highly accessible thanks to our range of catalogues and website, both of which allow for easy identification and specification. Designers and engineers can also find free 2D and 3D CAD downloads on the website www.wdsltd.co.uk. Available in all popular formats, using WDS products in your design has never been easier.



WDS products are REACH, RoHS and WEEE Compliant, for more details please visit www.wdsltd.co.uk



The following pages contain further technical information.

CAST IRON

Cast sections and base plates are supplied with unmachined surfaces painted, and are machined to the following tolerances:

Cast Iron



Material used to manufacture Hand Knobs, Handwheels, Knobs and Castor wheel centres. Cast Iron is a ferrous alloy

Parallelism	0.02/100mm (0.0025"/12")
Flatness	± 1/6000
Squareness	± 1 minute
General Dimensions	Diameter, Depth and Width ± 0.4mm Thickness ± 1/100 of Nominal

The ends of all cut cast iron section are supplied sawn such that they will clean up to the lengths stated in this catalogue.

ALUMINIUM

Aluminium



Material used to manufacture Handles, Handwheels and Section. Aluminium has a low density and is corrosion resistant ideal for aerospace, structural and machine applications

The ends of all cut aluminium section are supplied sawn such that they will clean up to the lengths stated in this catalogue.

STEEL

All steel parts are treated with a chemical black finish (unless otherwise stated) which gives adequate protection against rusting under normal workshop conditions.

Where stated as being surface hardened these parts have a wear resistant hardness in the range 50-60 HRC.

Metric threads are to ISO Coarse series except where otherwise stated.

Our products are constantly reviewed on a fitness for purpose basis and we reserve the right to change specifications, finishes etc. without prior notice.

Zinc Plated



Zinc plating is a process of coating a material which could be susceptible to corrosion. The zinc coating helps protect the base material.

PLASTIC

Selected WDS plastic products are available in various colours these include:

Black Grey



RAL 7021

Traffic Blue



RAL 5017

Pale Grey



RAL 7035

Signal Green



RAL 6032

Cadmium Yellow



RAL 1021

Traffic Red



RAL 3020

BAKELITE

Specific weight	1,4 g/cm ³
Maximum temperature	160°C up to 2 hours
.....	140°C 5000 hours
.....	120°C 25000 hours

Mechanical pressure resistance	200 N/mm ²
Fire resistance	V-1 - ul 94
Elasticity	6 - 8 KN/mm ²
Di-electrical rigidity	50 - 100 KV/cm

THERMOPLASTIC

Specific weight	1,13 g/cm ³
Water absorption	1,8% after 24 hours
Resistance to torsion	1050 Kg/cm ²
Resistance to compression	620 Kg/cm ²
Hardness Rockwell	R 119
Maximum heat	135° Celsius

GLASS FIBRE REINFORCED PLASTIC

Specific weight	1,44 g/cm ³
Water absorption	1,6% after 24 hours
Resistance to torsion	293 MPa
Hardness Rockwell	R 93
Maximum heat	145° Celsius

STAINLESS STEEL

WDS have a varied range of Stainless Steel products. This detailed catalogue displays the current product offering available in a range of Stainless Steel grades in particular 303, 304 and 316. The products in this catalogue are ideal for use in a range of environments such as Marine, Pharmaceutical, Chemical, Medical, Wash Down and Food Preparation.

MATERIAL SPECIFICATIONS

*All the information shown on this page is relevant to the material composition of products within this catalogue and should be used as a guide only.

BS970 Grade 301S21		Used to manufacture Springs for the Spring Plunger range (WDS823 + WDS838) Good corrosion resistance and elevated carbon to allow for cold working to a variety of temperatures
BS970 Grade 303S31	303	Used to manufacture many machined products within the WDS range Suitable for machinery, vats, bowls, pipework and occasional washdown Good resistance to mildly corrosive atmospheres
BS970 Grade 304S11	304	Used to manufacture many fabricated products within the WDS range Suitable for machinery, vats, bowls, pipework and occasional washdown Good resistance to mildly corrosive atmospheres
BS970 Grade 304S15		Used to manufacture Stainless Steel Toggle Clamps within the WDS range Stainless Steel Strip Material Good resistance to mildly corrosive atmospheres
BS970 Grade 316S11	316	The FOOD grade Stainless Steel Used to manufacture many products within the WDS range Generally associated with FOOD and MARINE industries Suitable for machinery, vats, bowls, pipework and frequent washdown Very High corrosion resistance
BS970 Grade 316S42		Used to manufacture Springs (WDS812) Stainless Steel Spring Wire
BS970 Grade 321S12		Used in the manufacturer of Spring Loaded Index Bolts (WDS826) and Clamping Handles (WDS8320 & 8325) Similar to the 304 grades with improved heat resistance due to the addition of Titanium
BS970 Grade 420S45		Used to manufacture Stainless Steel Ball Bearings within the WDS range Ball Bearings used in the assembly of Spring Plungers (WDS823) and Ball Spring Plungers (WDS838)
S3100:1997:316C16F		Used to manufacture products made from castings within the WDS range Casting Grade 316 Stainless Steel
Type 17.4 (SAE AMS 5643)		Used in the manufacture of Quick Release Pins within the WDS range Hardened Stainless Steel

Chemical Specification for Stainless Steel *

Grade	EN Number	C	Si	Mn	P	S	N	Cr	Mo	Ni	Other
301S21	1.431	0.05-0.15	2.0 max	2.0 max	0.045 max	0.015 max	0.11 max	16.0- 19.0	0.8 max	6.0-9.5	
303S31	1.4305	0.10 max	1.0 max	2.0 max	0.045 max	0.15-0.35	0.11 max	17.0- 19.0	-	8.0-10.0	
304S11	1.4306	0.03 max	1.0 max	2.0 max	0.045 max	0.015 max	0.11 max	18.0-20.0		10.0-12.0	
304S15	1.4301	0.07 max	1.0 max	2.0 max	0.045 max	0.015 max	0.11 max	17.5- 19.5	-	8.0-10.5	
316S11	1.4404	0.03 max	1.0 max	2.0 max	0.045 max	0.015 max	0.11 max	16.5- 18.5	2.0- 2.5	10.0/13.0	
316S42	1.4401	0.07 max	1.0 max	2.0 max	0.045 max	0.03 max	0.11 max	16.0- 18.5	2.0- 2.5	9.5/13.5	
321S12	1.4541	0.08 max	1.0 max	2.0 max	0.045 max	0.015 max	-	17.0- 20.0	-	9.0- 12.0	Ti 0.7 max
420S45	1.4025	0.26-0.35	1.0 max	1.5 max	0.040 max	0.015 max	-	12.0- 14.0	-		-

TOLERANCES

HOLES				
Above	Up to & including	H6	H7	H8
-	3	+ 0.006 0	+ 0.010 0	+ 0.014 0
3	6	+ 0.008 0	+ 0.012 0	+ 0.018 0
6	10	+ 0.009 0	+ 0.015 0	+ 0.022 0
10	18	+ 0.011 0	+ 0.018 0	+ 0.027 0
18	30	+ 0.013 0	+ 0.021 0	+ 0.033 0
30	50	+ 0.016 0	+ 0.025 0	+ 0.039 0
50	80	+ 0.019 0	+ 0.030 0	+ 0.046 0
80	120	+ 0.022 0	+ 0.035 0	+ 0.054 0
120	180	+ 0.025 0	+ 0.040 0	+ 0.063 0
180	250	+ 0.029 0	+ 0.046 0	+ 0.072 0
250	315	+ 0.032 0	+ 0.052 0	+ 0.081 0
315	400	+ 0.036 0	+ 0.057 0	+ 0.089 0
400	500	+ 0.040 0	+ 0.063 0	+ 0.097 0

SHAFTS								
		Slide Fit			Light Drive	Semi-med Drive	Medium Drive	Close Running
Above	Up to & including	h6	h7	h8	m6	n6	p6	g6
-	3	0 - 0.006	0 - 0.010	0 - 0.014	+ 0.008 + 0.002	+ 0.010 + 0.004	+ 0.012 + 0.006	- 0.002 - 0.008
3	6	0 - 0.008	0 - 0.012	0 - 0.018	+ 0.012 + 0.004	+ 0.016 + 0.008	+ 0.020 + 0.012	- 0.004 - 0.012
6	10	0 - 0.009	0 - 0.015	0 - 0.022	+ 0.015 + 0.006	+ 0.019 + 0.010	+ 0.024 + 0.015	- 0.005 - 0.014
10	18	0 - 0.011	0 - 0.018	0 - 0.027	+ 0.018 + 0.007	+ 0.023 + 0.012	+ 0.029 + 0.018	- 0.006 - 0.017
18	30	0 - 0.013	0 - 0.021	0 - 0.033	+ 0.021 + 0.008	+ 0.028 + 0.015	+ 0.035 + 0.022	- 0.007 - 0.020
30	50	0 - 0.016	0 - 0.025	0 - 0.039	+ 0.025 + 0.009	+ 0.033 + 0.017	+ 0.042 + 0.026	- 0.009 - 0.025
50	80	0 - 0.019	0 - 0.030	0 - 0.046	+ 0.030 + 0.011	+ 0.039 + 0.020	+ 0.051 + 0.032	- 0.010 - 0.029
80	120	0 - 0.022	0 - 0.035	0 - 0.054	+ 0.035 + 0.013	+ 0.045 + 0.023	+ 0.059 + 0.037	- 0.012 - 0.034
120	180	0 - 0.025	0 - 0.040	0 - 0.063	+ 0.040 + 0.015	+ 0.052 + 0.027	+ 0.068 + 0.043	- 0.014 - 0.039
180	250	0 - 0.029	0 - 0.046	0 - 0.072	+ 0.046 + 0.017	+ 0.060 + 0.031	+ 0.079 + 0.050	- 0.015 - 0.044
250	315	0 - 0.032	0 - 0.052	0 - 0.081	+ 0.052 + 0.020	+ 0.066 + 0.034	+ 0.088 + 0.056	- 0.017 - 0.049
315	400	0 - 0.036	0 - 0.057	0 - 0.089	+ 0.057 + 0.021	+ 0.073 + 0.037	+ 0.096 + 0.062	- 0.018 - 0.054
400	500	0 - 0.040	0 - 0.063	0 - 0.097	+ 0.063 + 0.023	+ 0.080 + 0.040	+ 0.108 + 0.068	- 0.020 - 0.060

CONVERSION TABLES

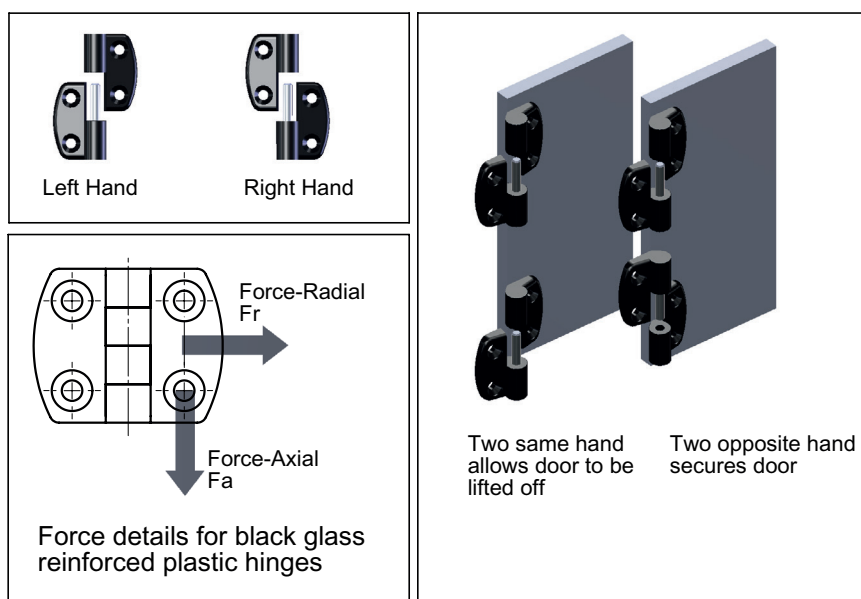
LENGTH			
mm to in		in to mm	
10	0.394	1	25.4
20	0.787	2	50.8
30	1.181	3	76.2
40	1.575	4	101.6
50	1.969	5	127
60	2.362	6	152.4
70	2.756	7	177.8
80	3.150	8	203.2
90	3.543	9	228.6
100	3.937	10	254

MASS				
lb to kg		kg/g to lb		
1	0.454	1	1000	2.205
2	0.907	2	2000	4.409
3	1.361	3	3000	6.614
4	1.814	4	4000	8.819
5	2.268	5	5000	11.023
6	2.722	6	6000	13.228
7	3.175	7	7000	15.432
8	3.629	8	8000	17.637
9	4.082	9	9000	19.842
10	4.536	10	10000	22.046

Please Note:

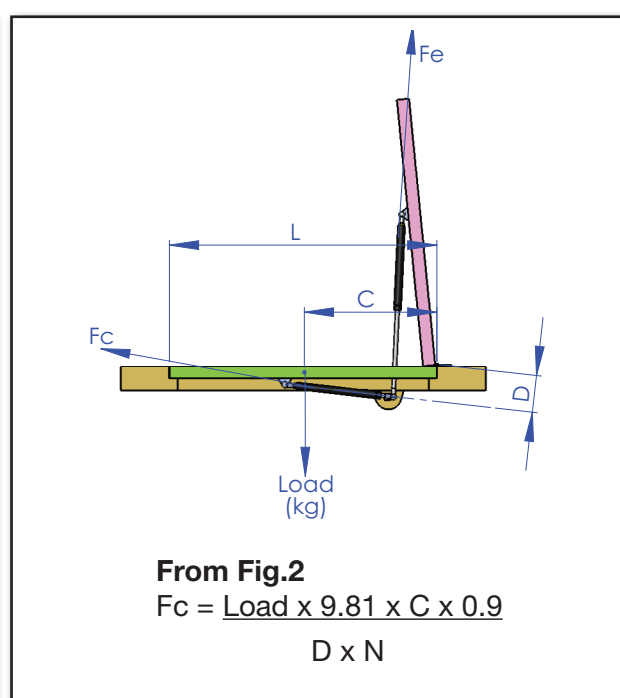
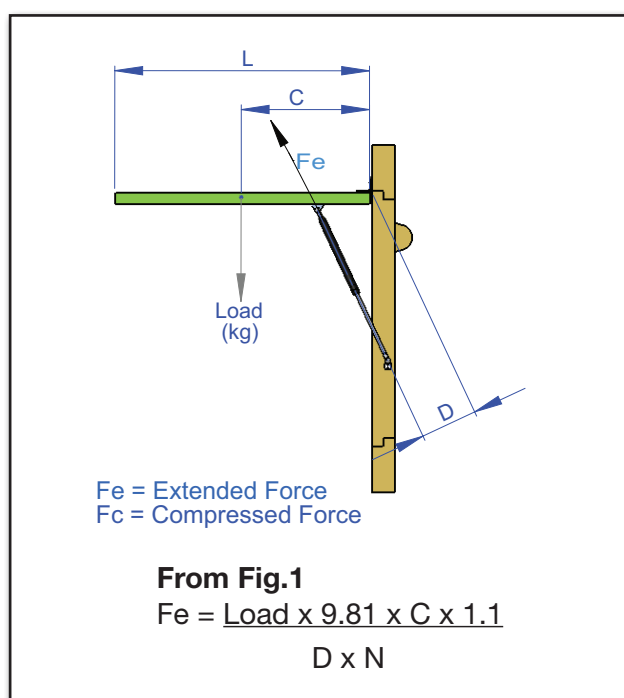
Data columns headed with g or kg refer to the approximate weight of each product.
All dimensions in metric unless otherwise shown.

CALCULATION FOR HINGES



Please refer to Section 14 Hinges for product dimensions

CALCULATION OF GAS STRUT FORCES



L = Length of Door (mm)

C = Distance from Centre of Gravity to Hinge (mm)

D = Distance from Gas Strut to Hinge (mm)

Load = Weight of door (kg)

N = Number of struts

F_e = Strut Force (Extended) in Newtons

F_c = Strut Force (Compressed) in Newtons