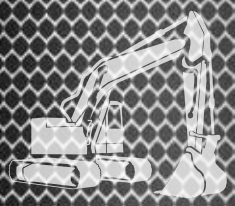
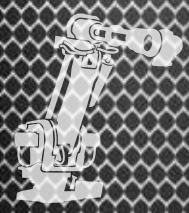
DUNLOP™

LINKAGES

Rod Ends and Spherical Plain Bearings





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DUNLOP™

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European Distribution Centre, Ashford, Kent UK
MPT House, Brunswick Road
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"We are proud to be a European manufacturer; it is a privilege to supply our products to some of the world's most prestigious original equipment manufacturers in the Agricultural, Automotive, Construction, Industrial and Motor Sport sectors".

"Our distributor network is vital to the continued global growth of the DUNLOP brand and our valued distributor partners form the perfect link between manufacturer and end user".

"Our commitment to our staff, our customers and the environment is of paramount importance to our company, we will continue to develop our organisational skills to further enhance our company's potential, to engage in sustainable practices and anticipate the needs and expectations of our customers".

"At Dunlop BTL we love our products".

Ray Mifsud, *Managing Director.*

DUNLOP™

ENGINEERING DATA

English

Español

Italiano

Deutsch

Français

Nederlands

Polskie

Application

There are several factors that need to be addressed to ensure the maximum performance and safe working of all **DUNLOP** rod ends, spherical bearings, ball joints and clevises.

- Rod ends and ball joints should where possible be mounted vertically, i.e. the housing member to the top, this will give maximum efficiency and life of the product.
- Cyclic motion in contaminated conditions can lead to premature failure, every effort should be taken to keep the unit clean, nylon and PTFE raced products have self-cleaning tendencies which can prove beneficial in contaminated environments.
- When mounting ball studs the hex should be properly tightened and flush to its mating surface. Adequate countersinks, counter bores or washers may be necessary to achieve acceptable assembly.
- Self-locking nuts or washers should be used in applications involving vibration and shock loads.
- It is recommended that separate stops should be mounted into the assembly to eliminate the possibility of over articulation of the rod end or ball joint over a maximum cone angle of 55°.
- Clamping forces can cause distortion of the ball and lead to a loss in internal tolerance, maximum torque values are shown below.
- All applications vary and so will product life, samples can be supplied for testing to help determine the suitability in actual operating conditions.
- Products listed in this catalogue are made to commercial standards, if you have any questions concerning a particular product or application please consult with our sales and engineering staff.

Bore Size Metric (mm)	Bore Size Imperial (inches)	Clamping Torque (Newton Metres) Bronze	Clamping Torque (Newton Metres) Steel
3		N/A	1.5
	0.1250	N/A	1.5
	0.1900	1.6	5.6
5		1.6	5.6
6		2.2	19.6
	0.2500	2.5	22.5
	0.3125	6.8	28.0
8		6.8	28.0
	0.3750	9.5	56.4
10		10.6	65.0
	0.4375	13.5	79.0
12		14.0	93.0
	0.5000	14.7	104.0
14		15.8	167.0
	0.6250	18.0	203.0
16		18.0	203.0
18		19.0	234.0
	0.7500	20.3	259.0
20		21.0	272.0

Materials

DUNLOP rod ends, spherical bearings, ball joints and clevises are available in a wide range of materials, steel, stainless steel and aluminium housings, nylon, PTFE and bronze races and steel, stainless steel and Bronze balls. Please refer to table below.

Housings

- Steel 230M07PB is used for all general purpose applications and are zinc plated and white-blue passivate (silver/clear finish) that conforms with RoHS directives on banned substances and ELV 2000/53/EC and are trivalent. Other plating colours and options are available, please refer to our 'Plating options section on page 14.
- Alloy steel, gives extreme load carrying capacity, extended wear life and high shock load resistance.
- Stainless steel 303L offers excellent corrosion resistance, other stainless steel materials such as 304 and 316 are available to order, please discuss with our sales or engineering departments.
- Aluminium A6026 also has corrosion resistance and weight reduction for lighter applications.

Races

- Nylon races are glass fibre reinforced and are suitable for extended high cycling use in heavy applications, also excellent in damp or wet environments.
- PTFE races provide zero backlash, smooth movement and can withstand extreme temperature conditions -200˚C to + 260˚C, and are suitable for use in high cycling use in heavy applications.
- Bronze design races SAE660 are suitable for low speed high duty loading, general purpose applications.

Spherical balls

- Steel 100Cr6 spherical balls are produced from high quality bearing steel and are heat treated and hardened to HRC 58-62 and electroless nickel plated.
- Stainless steel 440C spherical balls offer excellent corrosion resistance.
- Alloy steel, gives extreme load carrying capacity, extended wear life and high shock load resistance.
- Bronze SAE660 spherical balls are suitable for applications that require the pin or shaft fitted through the bore to rotate.

We reserve the right to vary the materials shown in the interest of product replacement or improvement.

Product Series	Housing Material	Housing Plating	Race Material	Ball/Ball Stud material	Ball Plating
MP / FP	230M07PB	ZINC WHITE/BLUE PASSIVATE	GR-NYLON	100CR6	ELECTROLESS NICKEL
MP-SS / FP-SS	303L	NOT PLATED	GR-NYLON	440C	NOT PLATED
MB / FB	230M07PB	ZINC WHITE/BLUE PASSIVATE	SAE660	100CR6	ELECTROLESS NICKEL
MB-SS / FB-SS	303L	NOT PLATED	SAE660	440C	NOT PLATED
MH / FH	230M07PB	ZINC WHITE/BLUE PASSIVATE	POLYURETHANE	230M07PB	NITROTEC
MH-SS / FH-SS	303L	NOT PLATED	POLYURETHANE	440C	NOT PLATED
MS / FS	230M07PB	ZINC WHITE/BLUE PASSIVATE	230M07PB / PTFE FABRIC	100CR6	ELECTROLESS NICKEL
MS-SS / FS-SS	303L	NOT PLATED	304L / PTFE FABRIC	440C	NOT PLATED
MSX / FSX	708M40	ZINC WHITE/BLUE PASSIVATE	230M07PB / PTFE MESH	100Cr6	ELECTROLESS NICKEL
MSX-MS / FSX-MS	17-4PH	N/A	17-4PH	440C	N/A
MX / FX	817M40	PHOSPHATED	N/A	100Cr6	PHOSPHATED

Product Series	Housing Material	Housing Plating	Race Material	Ball/Ball Stud material	Ball Plating
RM	230M07PB	ZINC WHITE/BLUE PASSIVATE	NYLON 66	100CR6	ELECTROLESS NICKEL
RM-SS	303L	NOT PLATED	NYLON 66	440C	NOT PLATED
GAR / GIR	080M46	ZINC WHITE/BLUE PASSIVATE	080M46 / PTFE FABRIC	100CR6	ELECTROLESS NICKEL
DB	230M07PB	ZINC WHITE/BLUE PASSIVATE	GR-NYLON	100CR6	ELECTROLESS NICKEL
AL	A6026	BLACK ANODISED	GR-NYLON	100CR6	ELECTROLESS NICKEL
SP	230M07PB	CHEMI-BLACKED	GR-NYLON	100CR6	ELECTROLESS NICKEL
SPH	230M07PB	ZINC WHITE/BLUE PASSIVATE	GRILAMID	230M07PB	NITROTEC
GE-ES	100CR6	MANGANESE PHOSPHATED	N/A	100CR6	MANGANESE PHOSPHATED
GEZ-ES	100CR6	MANGANESE PHOSPHATED	N/A	100CR6	MANGANESE PHOSPHATED
GE-UK	100CR6	NOT PLATED	PTFE FABRIC	100CR6	ELECTROLESS NICKEL
GE-FW	100CR6	NOT PLATED	PTFE FABRIC	100CR6	ELECTROLESS NICKEL
COM	100CR6	NOT PLATED	PTFE FABRIC	100CR6	ELECTROLESS NICKEL
SX	100CR6	PHOSPHATED	N/A	100CR6	PHOSPHATED
A	230M07PB	ZINC WHITE/BLUE PASSIVATE	NYLON 6	230M07PB	ZINC WHITE/BLUE PASSIVATE
BL	DIE CAST ZINC ALLOY	NOT PLATED	N/A	100CR6 / 535C	ZINC WHITE/BLUE PASSIVATE
BM	NYLON 12	NOT PLATED	N/A	230M07PB	ZINC WHITE/BLUE PASSIVATE
C	230M07PB	ZINC WHITE/BLUE PASSIVATE	N/A	212A42	ZINC WHITE/BLUE PASSIVATE
D	230M07PB	ZINC WHITE/BLUE PASSIVATE	N/A	230M07PB	ZINC WHITE/BLUE PASSIVATE
F	230M07PB	ZINC WHITE/BLUE PASSIVATE	N/A	230M07PB	ZINC WHITE/BLUE PASSIVATE
I	230M07PB	ZINC WHITE/BLUE PASSIVATE	NYLON 6	230M07PB	ZINC WHITE/BLUE PASSIVATE
P	230M07PB	ZINC WHITE/BLUE PASSIVATE	N/A	230M07PB	ZINC WHITE/BLUE PASSIVATE
Q	230M07PB	ZINC WHITE/BLUE PASSIVATE	N/A	230M07PB	ZINC WHITE/BLUE PASSIVATE
M	NYLON PA6.6	NOT PLATED	N/A	230M07PB	ZINC WHITE/BLUE PASSIVATE
G	080M46	ZINC WHITE/BLUE PASSIVATE	N/A	N/A	N/A

Load Capacity

Rod ends and spherical bearings

- The static load ratings listed are based on the yield strength of the race material and define the maximum gradually applied load.
- Radial load which the rod end or spherical bearing assembly can withstand, without significant permanent deformation.

- The steel housing provides a backup so that the product can sustain loading in excess of the listed values without collapsing.
- For highly stressed cyclic applications or those involving impact loads a safety factor of two or three should be applied to arrive at a safe working load.
- Although rod ends and spherical bearings are not recommended for use in applications involving axial loads, the construction is such that they can sustain axial loads up to 15% of the actual applied radial static load ratings without distress, but should not exceed 25% of the listed values.
- For extended life the recommended normally applied loads should be 25% - 50% of the static load ratings.
- All load ratings listed are presented for design guidance only and do not imply or constitute a warranty claim of any type.
- All applications vary and so will product life, samples can be supplied for testing to help determine the suitability in actual operating conditions.

Studs

- In applications using studded rod ends or spherical bearings the capacity of the product is limited by that of the stud to withstand sheer loading.
- Table below lists the expected minimum load capacities based on the use of studs made from carbon steel, please consult our sales and engineering departments where the applied loads exceed 50% of the listed values.

Ball joints

- The capacities listed are based on either the maximum tensile strength of the female body or the maximum shear strength of the ball stud, whichever is the lower. Suitable safety factors should be applied depending on the nature of the loading. Pull out force is the minimum required, when applied axially along the stud to cause complete disengagement of the stud from the housing.

Bore Size Metric (mm)	Bore Size Imperial (inches)	Ultimate Radial Loads (Newton
	0.1900	1,200
5		1,200
6		1,930
	0.2500	1,930
	0.3125	3,190
8		3,190
	0.3750	4,240
10		4,240
	0.4375	5,720
12		5,720
	0.5000	7,200
14		7,200
	0.6250	9,000
16		9,000

Temperature ranges

- The operating temperature range of rod ends and spherical bearings with a GR-nylon or nylon 66 race is limited by the thermal characteristics of the race material, this is -35°C to +170°C and -30°C to +120°C respectively . However in temperatures in excess of 80°C there may be a loss of load carrying capacity, e.g at 170°C an applied load equal to 20% of the static load rating can result in a compression set of .025mm.
- For application requiring extreme temperature ranges we recommend our liner, rod ends and spherical bearings can safely operate within a temperature range of -200°C to +260°C.
- Ball joints are generally temperature limited by the type of lubricant employed.

Specification

- Metric rod ends and spherical bearings are based on DIN 648.
- Imperial rod ends and spherical bearings are based on SAEJ1120.
- Metric ball joints are based on DIN71802 and DIN 71803.
- Imperial ball joints are based on SAEJ490.
- Metric clevises are based on DIN71752
- Imperial clevises are based on DIN71802
- All items are manufactured to commercial standards and tolerances, these tolerances are shown below.

Dimension	Metric (mm)	Imperial (inches)
Rod end bearings:		
Bore (Steel)	+0.064 - 0.013	+0.0025 - 0.0005
Bore (Bronze)	+0.038 - 0.013	+0.0015 - 0.0005
W	+0.000 - 0.0150	+0.000 - 0.0050
H	+0.050 - 0.050	+0.0030 - 0.0030
D	+0.130 - 0.130	+0.0050 - 0.0050
L1	+0.000 - 1.000	+0.0000 - 0.0620
L2	+0.250 - 0.250	+0.0320 - 0.0320
0	+0.050 - 0.050	+0.0030 - 0.0030
A	+0.130 - 0.130	+0.0050 - 0.0050
B	+0.250 - 0.250	+0.0320 - 0.0320
C	+0.050 - 0.050	+0.0030 - 0.0030
K	+0.130 - 0.130	+0.0050 - 0.0050
Spherical bearings:		
Bore (Steel)	+0.064 - 0.013	+0.0025 - 0.0005
Bore (Bronze)	+0.038 - 0.013	+0.0015 - 0.0005
D	+0.000 - 0.130	+0.0000 - 0.0050
H	+0.000 - 0.100	+0.0050 - 0.0050
W	+0.000 - 0.150	+0.0050 - 0.0050
Ball joints:		
Ball Ø	+0.064 - 0.013	+0.0025 - 0.0005

Table continued from over page:

Dimension	Metric (mm)	Imperial (inches)
L1	+0.000 - 1.000	+0.0000 - 0.0620
L2	+0.250 - 0.250	+0.0320 - 0.0320
STUD A/F	+0.130 - 0.130	+0.0050 - 0.0050
A	+0.130 - 0.130	+0.0050 - 0.0050
B	+0.250 - 0.250	+0.0320 - 0.0320
C	+0.050 - 0.050	+0.0030 - 0.0030
D1	+0.050 - 0.050	+0.0030 - 0.0030
D2	+0.050 - 0.050	+0.0030 - 0.0030
bore	+0.060 - 0.000	+0.0020 - 0.0000
G	+0.300 - 0.300	+0.0118 - 0.0118
A1	+0.300 - 0.160	+0.0118 - 0.0062
A2	+0.300 - 0.160	+0.0118 - 0.0062
B1	+0.150 - 0.000	+0.0060 - 0.0000
D3	+0.130 - 0.130	+0.0050 - 0.0050
L1	+0.500 - 0.500	+0.0196 - 0.0196
L2	+0.300 - 0.300	+0.0118 - 0.0118
L3	+0.300 - 0.300	+0.0118 - 0.0118
Ball studs:		
BALL Ø	+0.064 - 0.013	+0.0025 - 0.0005
A	+0.130 - 0.130	+0.0050 - 0.0050
B	+0.250 - 0.250	+0.0320 - 0.0320
C	+0.050 - 0.050	+0.0030 - 0.0030
K	+0.130 - 0.130	+0.0050 - 0.0050
Threads:		
Male	ISO 6G	Class 2A
Female	ISO 6H	Class 2B

ISO 9001:2008

Our committment is to quality, to continuously improve in every aspect of the companies activities. In 2006, we successfully passed UKAS quality assurance inspection to ISO 9001:2008 for the manufacture and distribution of bearings, power transmission and motion transfer linkages.

ISO 14001:2004

As a responsible European manufacturer, we take our environmental responsibility extremely seriously. In 2012, we successfully passed UKAS quality assurance inspection to ISO14001:2004 for the manufacture and distribution of bearings, power transmission and motion transfer linkages.

Plating Options

DUNLOP rod ends, spherical bearings, ball joints and clevises are available in a wide range of plating options. Our standard catalogue and stock specification is trivalent F39, zinc and white/blue passivate, (zinc and clear), that conforms with RoHS directives on banned substances and is ELV 2000/S3/EC compliant.

Table below shows our suffix designations, other available plating options may not be RoHS and ELV compliant, please enquire for availability. For a full list of options, please refer to table below.

BRITISH PLATING STANDARDS

BS3382 – Zinc plating of all steel parts with external threads

Basic major diameter of thread	Average plating thickness
0.127"-0.250" (3-6mm)	5.0 to 6.4 µm
0.251"-0.500" (6-12mm)	6.4 to 7.6 µm
0.501"-0.750" (12-19mm)	7.6 to 8.9 µm
0.751" and over (19mm)	8.9 to 12.7 µm

Finish Code	Finish Description
F0	SELF COLOUR
F1	ZINC PLATE & YELLOW PASSIVATE (CONTAINS HEXAVALENT CHROMIUM)
F2	ZINC PLATE & CLEAR PASSIVATE (CONTAINS HEXAVALENT CHROMIUM)
F3	PHOSPHATE, DE-EMBRITTLE & OIL
F4	ZINC NICKEL ALLOY & BLACK PASSIVATE 8 microns (2000 hours salt spray resistance)
F5	CHEMI-BLACK
F6	AS SPECIFIED ON CUSTOMERS DRAWING
F7	ZINC PLATE & BLUE PASSIVATE
F8	ZINC PLATE & OLIVE DRAB PASSIVATE TO ACCO CABLES (TRIDENT) SPEC. FS.25
F9	COPPER PLATE 0.0127/0.0203mm THICK
F10	DACROMET (REPLACED BY GEOMET F54)
F11	ZINC PLATE, DE-EMBRITTLE & YELLOW PASSIVATE (CONTAINS HEXAVALENT CHROMIUM)
F12	ZINC PLATE, DE-EMBRITTLE & CLEAR PASSIVATE
F13	ZINC PLATE, DE-EMBRITTLE & BLUE PASSIVATE
F14	ZINC PLATE, DE-EMBRITTLE & OLIVE DRAB PASSIVATE
F15	PHOSPHATE & OIL
F16	MECHANICAL ZINC PLATE & YELLOW PASSIVATE
F17	CATHODIC BLACK
F18	XYLON XL BLACK
F19	PHOSPHATE, DE-EMBRITTLE & OIL DRY TO TOUCH
F20	PARKERISE
F21	ZINC PLATE & BLACK PASSIVATE (CONTAINS HEXAVALENT CHROMIUM)
F22	PAINT TO IRR NATO GREEN – DEF STD 80-41
F23	ZINC PLATE & BRONZE PASSIVATE FORD WSD-M1P85-A2+WSB-M10P10-A4

Table continued from over page:

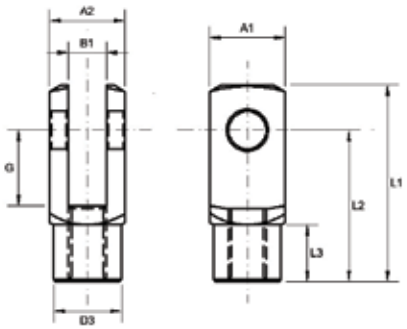
Finish Code	Finish Description
F24	RED OXIDE PAINT AND SPRAY BLACK GLOSS TO S/A SPEC 1000-SEDDON
F25	BLACK FURALON B5514 FORD SPEC WSK-M2P153-A3
F26	BRIGHT NICKEL FLASH (PLATING DEPOSIT 0.0025/0.0051mm)
F27	POWDER COAT PAINT
F28	OIL
F29	ZINC PLATE, DE-EMBRITTLE & BLACK PASSIVATE (CONTAINS HEXAVALENT CHROMIUM)
F30	BLACKODIZE
F31	BLACK PAINT TO AULTRAFAST SPEC AF1
F32	NITROTEC TO SPECIFICATION NQ40
F33	NITROTEC TO SPECIFICATION NQ3
F34	ZINC PLATE TO JS 500 (NO COLOUR)
F35	FERRITIC NITROCARBURISE
F36	ZINC NICKEL ALLOY & CLEAR PASSIVATE
F37	ZINC NICKEL ALLOY & YELLOW PASSIVATE
F38	ZINC PLATE & YELLOW TRIVALENT PASSIVATE (COLOUR DIE)
F39	ZINC PLATE & CLEAR TRIVALENT PASSIVATE
F40	DELTATONE & DELTASEAL BLACK (FREE FROM HEXAVALENT CHROMIUM)
F41	ZINC NICKEL PLATE, DE-EMBRITTLE & BLACK TRIVALENT PASSIVATE
F42	ZINC NICKEL PLATE & BLACK TRIVALENT PASSIVATE
F43	ZINC IRON PLATE & BLACK TRIVALENT PASSIVATE
F44	ZINC PLATE & BLACK TRIVALENT PASSIVATE
F45	ZINC NICKEL PLATE & CLEAR TRIVALENT PASSIVATE (BRIGHT FINISH)
F46	ZINC NICKEL PLATE, DE-EMBRITTLE & CLEAR TRIVALENT PASSIVATE
F47	ZINC PLATE, DE-EMBRITTLE & CLEAR TRIVALENT PASSIVATE WITHOUT SEALER
F48	ZINC PLATE, CLEAR TRIVALENT PASSIVATE AND SEAL (ZINKLAD 250)
F49	ZINC PLATE, DE-EMBRITTLE, CLEAR TRIVALENT PASSIVATE & SEAL (ZINKLAD 250)
F50	ZINC PLATE, THICK FILM PASSIVATE AND ADDITIONALLY SEAL / SST
F51	ZINC PLATE, DE-EMBRITTLE & YELLOW TRIVALENT PASSIVATE
F52	ZINC PLATE & TRIPASS CORROBLUE ELV
F53	ZINC PLATE, DE-EMBRITTLE & TRIPASS CORROBLUE ELV
F54	GEOMET 500 (REPLACES DACROMET A) F10
F55	SALT BATH NITRIDE TO AMS 2753B COMPOUND DEPTH .0003/.0010" SURFACE FILE HARD TO RC58.
F56	ZINC IRON PLATE, DE-EMBRITTLE & BLACK TRIVALENT PASSIVATE
F57	GEOMET 321 PLUS 10 VW 137 50, T602
F58	ELECTROLESS NICKEL PLATE
F59	CADMIUM PLATE TO DEF 03-19 AND CHROMATE PASSIVATE TO DEF 130
F60	BLACK PHOSPHATE DEF STAN 3-11 ROHS AND ELV COMPLIANT
F61	BLACK ANODISE ROHS & ELV COMPLIANT
F62	ZINC FLAKE COATING TO VW SPEC T630 TL233 SILVER
F63	BRIGHT NICKEL PLATE
F64	MANGANESE PHOSPHATE AND OIL
F65	ZINC NICKEL PLATE, DE-EMBRITTLE & Cr3 PASSIVATE TO KA SPEC PS224500
F66	ZINC NICKEL PLATE AND Cr3 PASSIVATE.
F67	ZINC PLATE, DE-EMBRITTLE & THICK FILM PASSIVATE AND ADDITIONALLY SEAL
F68	BLACK ON STAINLESS STEEL, STAY BLACK.

CLEVIS JOINTS

English
Español
Italiano
Deutsch
Français
Nederlands
Polskie

DUNLOP

CLEVIS JOINTS



G SERIES: GM - GI - GM SS

Description:
G-Series is our standard range of metric and imperial clevises also known as 'yoke' and 'fork' ends. In addition to our catalogue range, we have produced over 2,000 special clevises to suit individual customer applications, therefore please enquire for any item not shown. Imperial sizes are easily identified by a groove on the tail. Stainless steel clevis assemblies are also available.

Metric sizes up to GML16 are used with ESM folding spring pins on page 97 or with NBM clevis pins on page 98. GM18 - GM30 are used with DEM clevis pins on page 99, size GM20 may also be used with ESM20 on page 97. Imperial sizes up to GIL625 are used with ESI folding spring pins on page 97 or with NBI clevis pins on page 98. GI750 - GI1000 are used with DEI clevis pins on page 99.

Material Specifications:
Clevis: Steel 230M07PB zinc plated and clear trivalent passivate and stainless steel 303L.

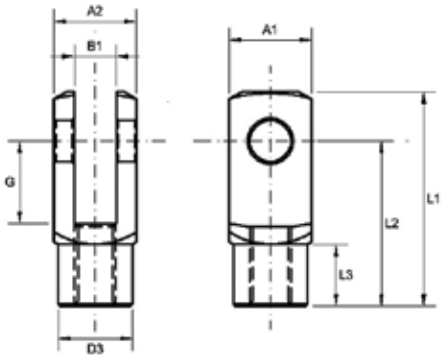
Features
Metric & imperial thread & bore sizes
Standard & long series
Course & fine threads
No maintenance

Possible Applications
Light to heavy industrial/ mechanical applications
Construction equipment
Agricultural equipment
Industrial equipment

Temperature Range
-40°C to +170°C

Specification
ELV & RoHS compliant

GM SERIES: STEEL CLEVIS JOINTS (METRIC)



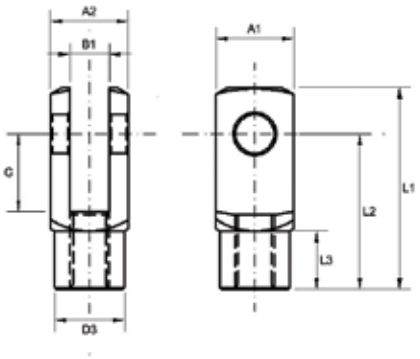
Material: Steel 230M07Pb, Zinc Plated and Clear Trivalent Passivate

Specification: ELV and RoHS Compliant

Part No. Right Hand	Part No. Left Hand	Bore Size*	Thread	G	A1	A2	B1	D3	L1	L2	L3
GM4	GM4LH	4	M4X0.70	8	8	8	4	8	21	16	6.0
GML4	GML4LH	4	M4X0.70	16	8	8	4	8	29	24	6.0
GM5	GM5LH	5	M5X0.80	10	10	10	5	9	26	20	7.5
GML5	GML5LH	5	M5X0.80	20	10	10	5	9	36	30	7.5
GM6	GM6LH	6	M6X1.00	12	12	12	6	10	31	24	9.0
GML6	GML6LH	6	M6X1.00	24	12	12	6	10	43	36	9.0
GM8	GM8LH	8	M8X1.25	16	16	16	8	14	42	32	12.0
GML8	GML8LH	8	M8X1.25	32	16	16	8	14	58	48	12.0
GM8C	GM8CLH	8	M8X1.00	16	16	16	8	14	42	32	12.0
GML8C	GML8CLH	8	M8X1.00	32	16	16	8	14	58	48	12.0
GM10	GM10LH	10	M10X1.50	20	20	20	10	18	52	40	15.0
GML10	GML10LH	10	M10X1.50	40	20	20	10	18	72	60	15.0
GM10C	GM10CLH	10	M10X1.25	20	20	20	10	18	52	40	15.0
GML10C	GML10CLH	10	M10X1.25	40	20	20	10	18	72	60	15.0
GM12	GM12LH	12	M12X1.75	24	24	24	12	20	62	48	18.0
GML12	GML12LH	12	M12X1.75	48	24	24	12	20	86	72	18.0
GM12C	GM12CLH	12	M12X1.25	24	24	24	12	20	62	48	18.0
GML12C	GML12CLH	12	M12X1.25	48	24	24	12	20	86	72	18.0
GM14	GM14LH	14	M14X2.00	28	27	27	14	24	72	56	22.5
GML14	GML14LH	14	M14X2.00	56	27	27	14	24	101	85	22.5
GM14C	GM14CLH	14	M14X1.50	28	27	27	14	24	72	56	22.5
GML14C	GML14CLH	14	M14X1.50	56	27	27	14	24	101	85	22.5
GM16	GM16LH	16	M16X2.00	32	32	32	16	26	83	64	24.0
GM16C	GM16CLH	16	M16X1.50	32	32	32	16	26	83	64	24.0
GML16	GML16LH	16	M16X2.00	64	32	32	16	26	115	96	24.0
GML16C	GML16CLH	16	M16X1.50	64	32	32	16	26	115	96	24.0
GM18	GM18LH	18	M18X2.50	36	36	36	18	30	94	72	27.0
GM18C	GM18CLH	18	M18X1.50	36	36	36	18	30	94	72	27.0
GM20	GM20LH	20	M20X2.50	40	40	40	20	34	105	80	30.0
GM20C	GM20CLH	20	M20X1.50	40	40	40	20	34	105	80	30.0
GM25	GM25LH	25	M24X3.00	50	50	50	25	42	132	100	36.0
GM25C	GM25CLH	25	M24X2.00	50	50	50	25	42	132	100	36.0
GM28	GM28LH	28	M27X3.00	56	55	55	28	48	148	112	40.0
GM28C	GM28CLH	28	M27X2.00	56	55	55	28	48	148	112	40.0
GM30	GM30LH	30	M30X3.50	60	60	60	30	52	160	120	42.0
GM30C	GM30CLH	30	M30X2.00	60	60	60	30	52	160	120	42.0

**Cross hole tolerance: +0.06 -0.00 mm*

GI SERIES: STEEL CLEVIS JOINTS (IMPERIAL)



Material: Steel 230M07Pb, Zinc Plated and Clear Trivalent Passivate

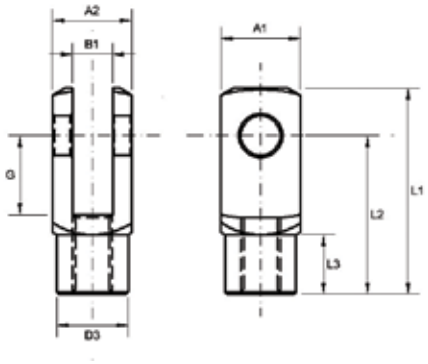
Specification: ELV and RoHS Compliant

Part No. Right Hand	Part No. Left Hand	Bore Size*	Thread	G	A1	A2	B1	D3	L1	L2	L3
GI187	GI187 LH	3/16	10-32 UNF	0.394	0.375	0.375	0.1875	0.354	1.024	0.788	0.295
GIL187	GIL187 LH	3/16	10-32 UNF	0.787	0.375	0.375	0.1875	0.354	1.417	1.181	0.295
GI250	GI250 LH	1/4	1/4 UNF	0.472	0.500	0.500	0.2500	0.394	1.220	0.944	0.354
GIL250	GIL250 LH	1/4	1/4 UNF	0.945	0.500	0.500	0.2500	0.394	1.693	1.417	0.354
GI312	GI312 LH	5/16	5/16 UNF	0.630	0.630	0.630	0.3125	0.551	1.654	1.260	0.472
GIL312	GIL312 LH	5/16	5/16 UNF	1.260	0.630	0.630	0.3125	0.551	2.283	1.890	0.472
GI375	GI375 LH	3/8	3/8 UNF	0.787	0.750	0.750	0.3750	0.708	2.047	1.574	0.591
GIL375	GIL375 LH	3/8	3/8 UNF	1.575	0.750	0.750	0.3750	0.708	2.834	2.362	0.591
GI500	GI500 LH	1/2	1/2 UNF	1.102	1.000	1.000	0.5000	0.945	2.834	2.204	0.886
GIL500	GIL500 LH	1/2	1/2 UNF	2.205	1.000	1.000	0.5000	0.945	3.976	3.346	0.886
GI625	GI625 LH	5/8	5/8 UNF	1.260	1.250	1.250	0.6250	1.024	3.268	2.520	0.945
GIL625	GIL625 LH	5/8	5/8 UNF	2.520	1.250	1.250	0.6250	1.024	4.528	3.780	0.945
GI750	GI750 LH	3/4	3/4 UNF	1.575	1.575	1.575	0.7500	1.339	4.134	3.150	1.181
GI1000	GI1000 LH	1	1 UNF	1.969	1.970	1.970	1.0000	1.654	5.197	3.938	1.417

**Cross hole tolerance: +0.06 -0.00 mm.*
Stainless steel materials such as 304, 314 and 316 are also available to order, please enquire for further information.

**Cross hole tolerance: +0.06 -0.00 mm. Stainless steel materials such as 304, 314 and 316 are also available to order, please enquire for further information.*

GM SS SERIES: ASSEMBLY SERIES STAINLESS STEEL CLEVIS JOINTS (METRIC)



Clevis: Stainless Steel 303

Clevis Pin: Stainless Steel 303

Washer: Stainless Steel 303

Split Pin: Stainless Steel 303

Specification: ELV and RoHS Compliant

Part No. Right Hand	Part No. Left Hand	Bore Size*	Thread	G	A1	A2	B1	D3	L1	L2	L3
GM4SS-ASSY	GM4SSLH-ASSY	4	M4X0.70	8	8	8	4	8	21	16	6.0
GML4SS-ASSY	GML4SSLH-ASSY	4	M4X0.70	16	8	8	4	8	29	24	6.0
GM5SS-ASSY	GM5SSLH-ASSY	5	M5X0.80	10	10	10	5	9	26	20	7.5
GML5SS-ASSY	GML5SSLH-ASSY	5	M5X0.80	20	10	10	5	9	36	30	7.5
GM6SS-ASSY	GM6SSLH-ASSY	6	M6X1.00	12	12	12	6	10	31	24	9.0
GML6SS-ASSY	GML6SSLH-ASSY	6	M6X1.00	24	12	12	6	10	43	36	9.0
GM8SS-ASSY	GM8SSLH-ASSY	8	M8X1.25	16	16	16	8	14	42	32	12.0
GML8SS-ASSY	GML8SSLH-ASSY	8	M8X1.25	32	16	16	8	14	58	48	12.0
GM10SS-ASSY	GM10SSLH-ASSY	10	M10X1.50	20	20	20	10	18	57	40	15.0
GML10SS-ASSY	GML10SSLH-ASSY	10	M10X1.50	40	20	20	10	18	72	60	15.0
GM12SS-ASSY	GM12SSLH-ASSY	12	M12X1.75	24	24	24	12	20	62	48	18.0
GML12SS-ASSY	GML12SSLH-ASSY	12	M12X1.75	48	24	24	12	20	86	72	18.0
GM14SS-ASSY	GM14SSLH-ASSY	14	M14X2.00	28	27	27	14	24	72	56	22.5
GML14SS-ASSY	GML14SSLH-ASSY	14	M14X2.00	56	27	27	14	24	101	85	22.5
GM16SS-ASSY	GM16SSLH-ASSY	16	M16X2.00	32	32	32	16	26	83	64	24.0
GML16SS-ASSY	GML16SSLH-ASSY	16	M16X2.00	64	32	32	16	26	115	96	24.0
GM18SS-ASSY	GM18SSLH-ASSY	18	M18X2.50	36	36	36	18	30	94	72	27.0
GM20SS-ASSY	GM20SSLH-ASSY	20	M20X2.50	40	40	40	20	34	105	80	30.0
GM25SS-ASSY	GM25SSLH-ASSY	25	M24X3.00	50	50	50	25	42	132	100	36.0
GM28SS-ASSY	GM28SSLH-ASSY	28	M27X3.00	56	55	55	28	48	148	112	40.0
GM30SS-ASSY	GM30SSLH-ASSY	30	M30X3.50	60	60	60	30	52	160	120	42.0

DUNLOP

CLEVIS JOINTS

ES SERIES: ESM - ESI

Description:
ES-Series is our standard range of metric and imperial folding spring pins for use with GM and GI Clevis joints. They are easily pre-assembled or removed by hand without the need for any tools. ESM folding spring pins for use with GM-Series metric clevis joints. ESI folding spring pins for use with GI-Series imperial clevis joints.

Material Specifications:
Pin: Steel 230M07PB zinc plated and clear trivalent passivate.
Spring: CS70 carbon steel, hardened and tempered and zinc plated and clear trivalent passivate.

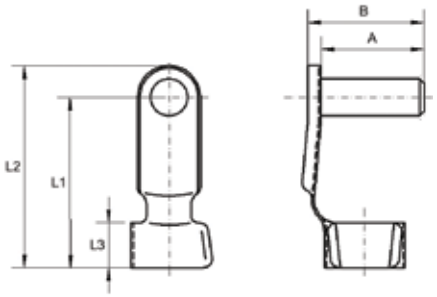
Features
Metric & imperial sizes
Standard & long series
No maintenance

Possible Applications
Light - heavy industrial/ mechanical applications
Construction equipment
Agricultural equipment
Industrial equipment

Temperature Range
-40°C to +170°C

Specification
ELV & RoHS compliant

ESM SERIES: FOLDING SPRING PIN CLEVIS JOINTS (METRIC)



Pin: Steel 230M07Pb, Zinc Plated and Clear Trivalent Passivate

Spring: Spring Steel, Hardened, Zinc Plated and Clear Trivalent Passivate

Specification: ELV and RoHS Compliant

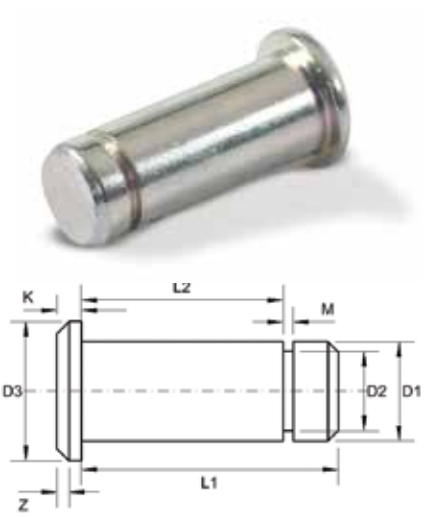
Part No.	Pin Size	A	B	L1	L2	L3
ESM4	4	9.5	11.0	15.0	18.5	4.5
ESM5	5	12.0	13.5	19.0	23.0	5.5
ESML5	5	12.0	13.5	29.0	33.0	5.5
ESM6	6	14.0	16.0	23.0	28.0	6.5
ESML6	6	14.0	16.0	35.0	40.0	6.5
ESM8	8	19.0	21.5	30.0	36.5	8.0
ESML8	8	19.0	21.5	46.0	52.0	8.0
ESM10	10	23.0	26.0	38.0	45.0	10.0
ESML10	10	23.0	26.0	58.0	65.0	10.0
ESM12	12	28.0	31.0	45.0	53.0	12.0
ESML12	12	28.0	31.0	69.0	78.0	12.0
ESM14	14	29.4	34.0	52.0	62.0	14.0
ESML14	14	29.4	34.0	82.0	91.0	14.0
ESM16	16	36.0	39.0	62.0	73.5	16.0
ESML16	16	36.0	39.0	92.0	103.0	16.0
ESM20	20	44.0	49.0	71.0	88.0	16.0

ESI SERIES: FOLDING SPRING PIN CLEVIS JOINTS (IMPERIAL)

Part No.	Pin Size	A	B	L1	L2	L3
ESI187	3/16	0.430	0.490	0.750	0.900	0.220
ESIL187	3/16	0.430	0.490	1.140	1.300	0.220
ESI250	1/4	0.560	0.640	0.900	1.100	0.250
ESIL250	1/4	0.560	0.640	1.380	1.570	0.250
ESI312	5/16	0.700	0.790	1.180	1.430	0.310
ESIL312	5/16	0.700	0.790	1.810	2.050	0.310
ESI375	3/8	0.830	0.950	1.500	1.770	0.390
ESIL375	3/8	0.830	0.950	2.280	2.560	0.390
ESI500	1/2	1.090	1.210	2.050	2.440	0.550
ESIL500	1/2	1.090	1.210	3.230	3.580	0.550
ESI625	5/8	1.350	1.470	2.440	2.890	0.630
ESIL625	5/8	1.350	1.470	3.620	4.050	0.630

DUNLOP

CLEVIS JOINTS



NB SERIES: NBM - NBI

Description:
NB-Series is our standard range of metric and imperial clevis pins for use with GM and GI clevis joints. NBM clevis pins for use with GM series metric clevis joints. NBI clevis pins for use with GI series imperial clevis joints.

Material Specifications:
Pin: Steel 230M07PB zinc plated and clear trivalent passivate.

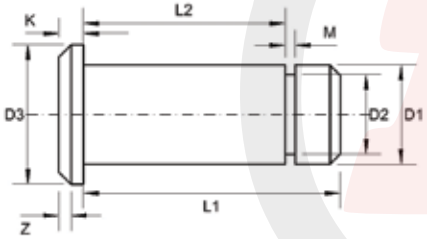
Features
Metric & imperial sizes
Standard & long series
No maintenance

Possible Applications
Light - heavy industrial/ mechanical applications
Construction equipment
Agricultural equipment
Industrial equipment

Temperature Range
-40°C to +170°C

Specification
ELV & RoHS compliant

NBM SERIES: STEEL CLEVIS PINS (METRIC)



Pin: Steel 230M07Pb, Zinc Plated and Clear Trivalent Passivate

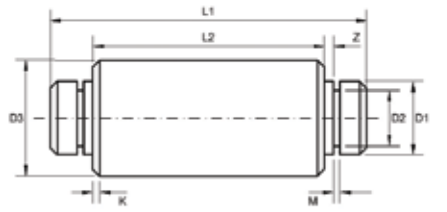
Specification: ELV and RoHS Compliant

Part No.	Pin Size D1	D2	D3	K	M	Z	L1	L2
NBM4	4	3.2	6	1.5	0.74	0.75	10.35	8.25
NBM5	5	4.1	8	1.0	0.84	0.50	12.85	10.25
NBM6	6	5.1	9	1.5	0.84	0.75	15.35	12.25
NBM8	8	6.1	12	2.0	1.04	1.00	19.85	16.25
NBM10	10	8.2	14	2.5	1.15	1.25	24.85	20.25
NBM12	12	9.2	16	3.0	1.25	1.25	29.35	24.25
NBM14	14	10.2	18	3.0	1.35	1.25	32.85	27.25
NBM16	16	12.2	20	3.5	1.45	1.50	38.35	32.25

NBI SERIES: STEEL CLEVIS PINS (IMPERIAL)

Part No.	Pin Size D1	D2	D3	K	M	Z	L1	L2
NBI187	3/16	0.140	0.250	0.050	0.028	0.030	0.480	0.385
NBI250	1/4	0.193	0.343	0.062	0.034	0.030	0.625	0.510
NBI312	5/16	0.240	0.437	0.078	0.041	0.040	0.770	0.635
NBI375	3/8	0.301	0.500	0.090	0.045	0.050	0.932	0.760
NBI500	1/2	0.388	0.625	0.110	0.054	0.060	1.223	1.010
NBI625	5/8	0.480	0.781	0.120	0.057	0.060	1.491	1.260

CLEVIS JOINTS



DE SERIES: DEM - DEI

Description:
DE-Series is our standard range of metric and imperial clevis pins for use with GM and GI Clevis joints. DEM clevis pins are designed for use with GM20 - GM30 clevis Joints. DEI clevis pins are designed for use with GI750 - GI1000 clevis joints.

Material Specifications:
Pin: Steel 230M07PB zinc plated and clear trivalent passivate.

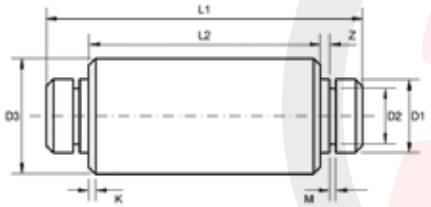
Features
Metric & imperial sizes
Standard & long series
No maintenance

Possible Applications
Light to heavy industrial/ mechanical applications
Construction equipment
Agricultural equipment
Industrial equipment

Temperature Range
-40°C to +170°C

Specification
ELV & RoHS compliant

DEM SERIES: STEEL CLEVIS PINS (METRIC)



Pin: Steel 230M07Pb, Zinc Plated and Clear Trivalent Passivate

Specification: ELV and RoHS Compliant

Part No.	D1	D2	Pin Size D3	K	M	Z	L1	L2	Other Items Required
DEM20	15.87	12.2	20	1.5	1.35	NO SHOULDER	52.22	40.50	2 X SLM16 (ONLY)
DEM25	15.87	12.2	25	1.5	1.35	2.08	66.38	50.50	2 X SLM16+ 2 X M7105
DEM30	15.87	12.2	30	1.5	1.35	3.75	79.72	60.50	2 X SLM16 + 2 X M7107

DEI SERIES: STEEL CLEVIS PINS (IMPERIAL)

Part No.	D1	D2	Pin Size D3	K	M	Z	L1	L2	Other Items Required
DEI750	0.625	0.480	0.75	0.04	0.053	NO SHOULDER	2.066	1.594	2 X SLM16 (ONLY)
DEI1000	0.625	0.480	1.00	0.06	0.053	0.082	2.624	1.988	2 X SLM16 + 2 X M7105

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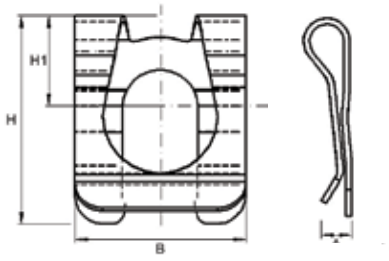
CLEVIS JOINTS



SL SERIES: SLM - SLI

Description:
SL-Series is our standard range of metric and imperial safety clips for use with GM and GI Clevis joints. They are easily pre-assembled or removed by hand without the need for any tools. SLM safety clips are designed for use with NBM clevis pins. SLI safety clips are designed for use with NBI clevis pins. SLM16 is also compatible with
DEM20 - DEM30. SLM16 is also compatible with DEI750 - DEI1000.

Material Specifications:
Clip: CS70 carbon steel hardened and tempered and zinc plated and clear trivalent passivate.

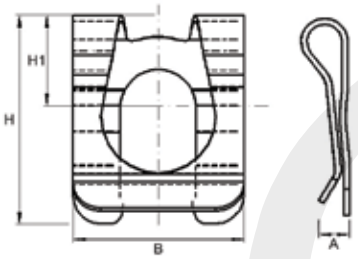
Features
Metric & imperial sizes
Safety lip prevents accidental removal
Assembly rattle is eliminated by the fastener holding the clevis pin under tension

Possible Applications
Light to heavy industrial/ mechanical
Construction equipment
Agricultural equipment
Industrial equipment

Temperature Range
-40°C to +170°C

Specification
ELV & RoHS compliant

SLM SERIES: SPRING STEEL SAFETY CLIP (METRIC)



Safety Clip: Spring Steel, Zinc Plated and Clear Trivalent Passivate, Hardened and Annealed to 1450 to 1600 N/mm² Tensile Strength

Specification: ELV and RoHS Compliant

Part No.	Pin Size	B	H	H1	A	Thickness	Max Axial Thrust (n)
SLM4	4	7.0	8.75	4.0	2.2	0.30	1,000
SLM5	5	9.0	11.00	5.0	2.3	0.35	1,300
SLM6	6	11.0	14.25	6.0	3.2	0.40	1,500
SLM8	8	14.0	17.50	8.0	3.7	0.45	3,600
SLM10	10	18.0	21.75	10.3	4.6	0.50	6,400
SLM12	12	22.0	26.00	12.0	5.5	0.50	9,600
SLM14	14	25.1	30.10	13.5	5.8	0.60	11,320
SLM16	16	28.0	34.50	16.0	6.8	0.60	13,500

SLI SERIES: SPRING STEEL SAFETY CLIP (IMPERIAL)

Part No.	Pin Size	B	H	H1	A	Thickness	Max Axial Thrust (n)
SLI187	3/16	0.355	0.429	0.195	0.084	0.0135	1,300
SLI250	1/4	0.437	0.562	0.245	0.130	0.0150	1,500
SLI312	5/16	0.551	0.689	0.315	0.146	0.0170	3,600
SLI375	3/8	0.710	0.844	0.385	0.211	0.0190	6,400
SLI500	1/2	1.000	1.200	0.520	0.235	0.0230	9,600
SLI625	5/8	1.102	1.358	0.630	0.237	0.0230	13,500

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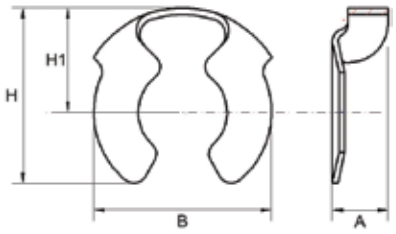
CLEVIS JOINTS



KL SERIES: KLM

Description:
KL-Series is our range of metric safety clips for use with GM clevis joints, they are easily pre-assembled or removed by hand without the need for any tools, KLM retaining clips are designed as an alternative option to SLM safety clips. KLM safety clips are designed for use with NBM clevis pins.

Material Specifications:
Clip: CS70 carbon steel hardened and tempered and zinc plated and clear trivalent passivate.

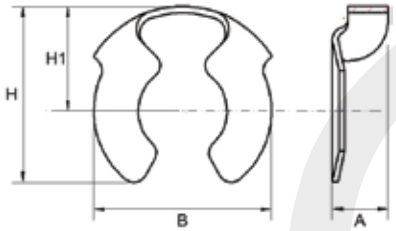
Features
Metric sizes
Dished design ensures clip is under constant tension to minimise rattle

Possible Applications
Light to heavy industrial/ mechanical
Agricultural equipment
Industrial equipment
Construction equipment

Temperature Range
-40°C to +170°C

Specification
ELV & RoHS compliant

KLM SERIES: SPRING STEEL SAFETY CLIP (METRIC)



Safety Clip: Spring Steel, Zinc Plated and Clear Trivalent Passivate, Hardened and Annealed to 1450 to 1600 N/mm² Tensile Strength

Specification: ELV and RoHS Compliant

Note: Dimensions may vary slightly in line with DIN standards.

Part No.	Pin Size	B	H	H1	A	Thickness	Max Axial Thrust (n)
KLM4	4	6.8	7.0	4.3	2.6	0.40	1,500
KLM5	5	7.7	8.4	5.2	2.8	0.50	3,000
KLM6	6	10.6	11.7	6.8	3.5	0.50	4,850
KLM8	8	11.5	11.8	7.4	4.0	0.50	5,500
KLM10	10	15.5	15.9	9.5	5.0	0.60	9,500
KLM12	12	17.2	18.5	11.5	6.0	0.60	10,700
KLM14	14	19.7	20.0	11.9	6.7	0.70	12,700
KLM16	16	23.2	24.5	14.6	7.0	0.80	14,000
KLM24	24	34.0	34.0	18.5	9.0	1.00	15,000

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"We are proud to be a European manufacturer; it is a privilege to supply our products to some of the world's most prestigious original equipment manufacturers in the Agricultural, Automotive, Construction, Industrial and Motor Sport sectors".

"Our distributor network is vital to the continued global growth of the DUNLOP brand and our valued distributor partners form the perfect link between manufacturer and end user".

"Our commitment to our staff, our customers and the environment is of paramount importance to our company, we will continue to develop our organisational skills to further enhance our company's potential, to engage in sustainable practices and anticipate the needs and expectations of our customers".

"We love our products".

Ray Mifsud, *Managing Director.*

#WeLoveOurProducts

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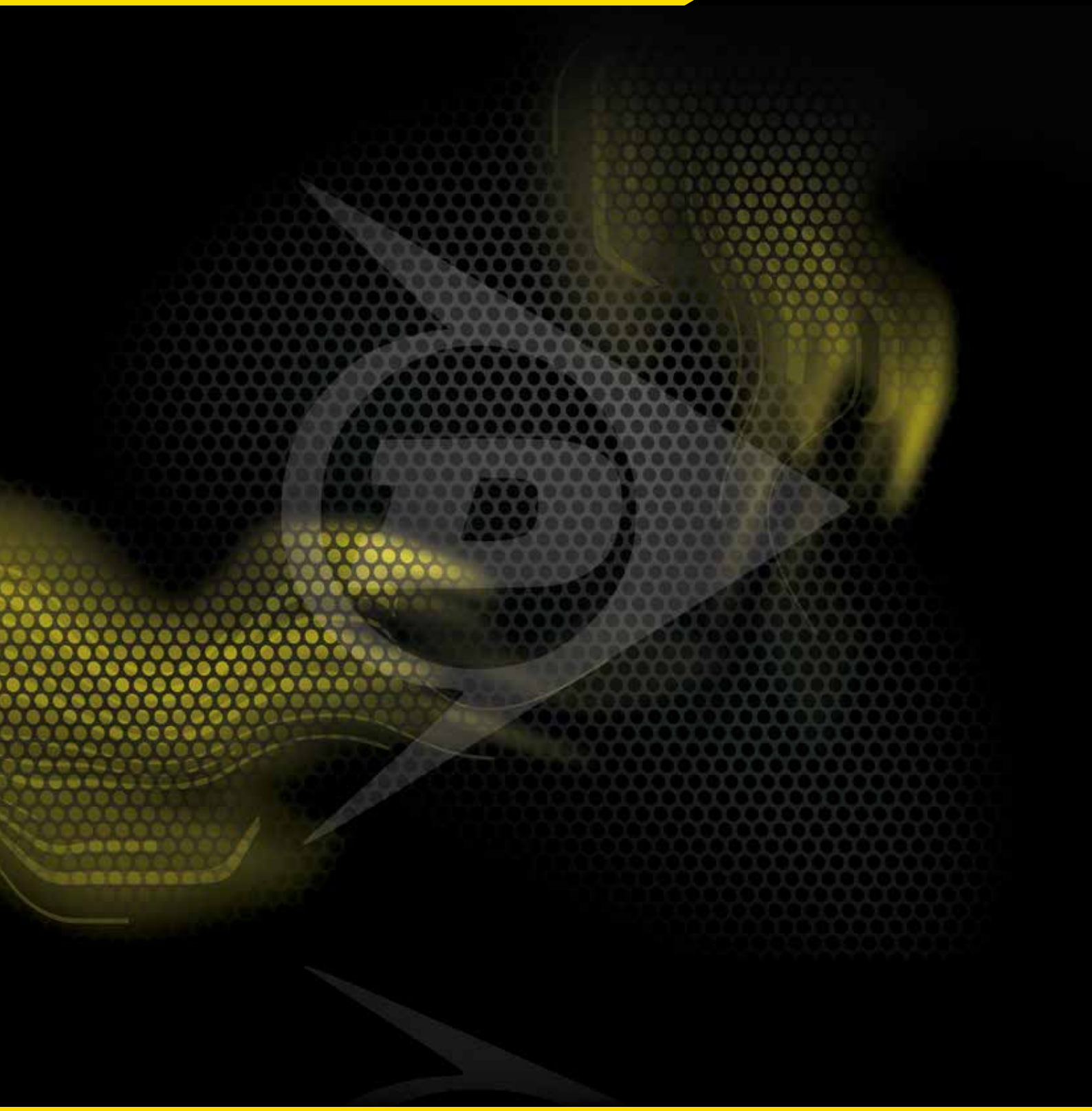

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