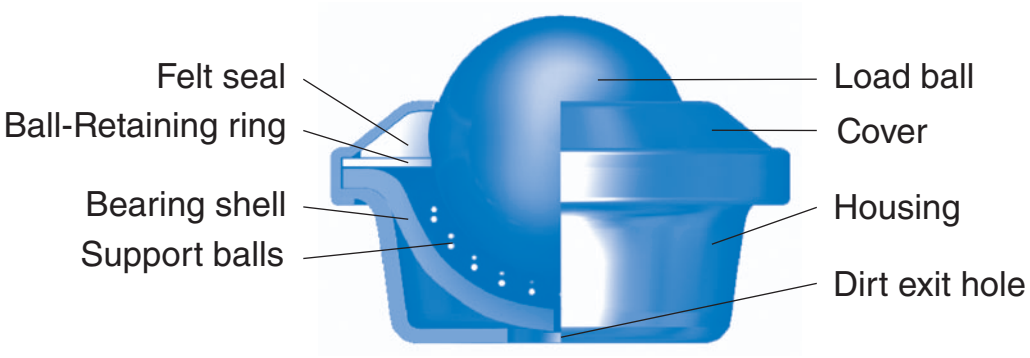
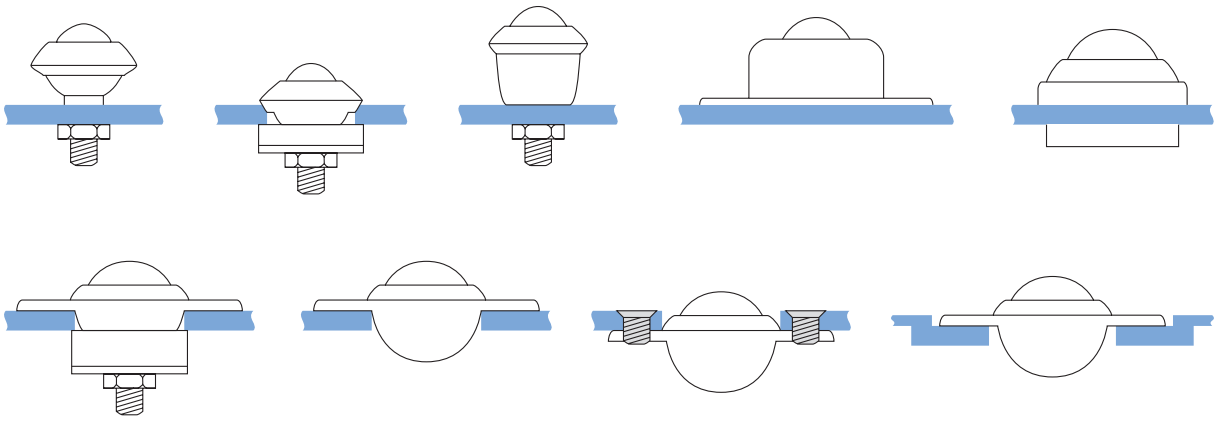
Design and Construction



Ball units are a multi-directional, material handling system, manufactured from high quality materials. They consist of a large load-bearing ball which sits upon many small balls encapsulated in a hemi-spherical cup. The housing can contain a seal to clean the load ball as it rotates. The design greatly reduces friction and allows heavy loads to be moved with a minimum of effort. Our ball units may be used at any orientation but deviation from the vertical may result in a reduction in the stated load ratings quoted in this catalogue.

Fixing Methods



There are various methods of fixing ball units. A wide range of fittings enable them to be used with various different materials. Fixing clips are available for most designs.

Material

Type	Loadball	Supportball	Housing
-13	Carbon Steel 60-66 HRC	Carbon Steel 60-66 HRC	Carbon Steel Bright Zinc Plated
-14	Polyamid PA66	Carbon-Chrome 60-66 HRC	Carbon Steel Bright Zinc Plated
-15	Stainless Steel AISI 420 52-58 HRC	Stainless Steel AISI 420 52-58 HRC	Stainless Steel AISI 304 Self Colour
-14	Stainless Steel AISI 420 52-58 HRC	Stainless Steel AISI 420 52-58 HRC	Carbon Steel Bright Zinc Plated

Ball units are available in various materials. The material required for your ball units should be quoted when ordering - see next page for ordering details.

Lubrication
Each unit is pre-lubricated during manufacture and normally does not require further attention. In certain instances we will advise on lubrication. Greasing or oil points can be incorporated in some units.

Cleaning
A suitable cleaning or release fluid should be used in dirty conditions. For washing, a suitable detergent such as paraffin, for freeing, a suitable agent such as AC 90 - please consult technical support. Most designs have dirt exit holes incorporated in the bearing cup, or these can be added on request.

Shock Loads
When calculating loads, consider the possibility of impact caused by incorrect levels. Spring loaded units will reduce wear and tear if there are regular shock impacts. Shock loading can also be reduced by fitting compressible pads. Ball units can also be made retractable by other means, such as pneumatic or hydraulic cylinders, cams or levers. They can be programmed to operate in sequence. All stated loads in the catalogue are dynamic loads.

Self Levelling
Can be achieved by fitting rubber pads. This reduces excessive loads on just a few units. Details on request.

Temperature Range

Carbon Steel Load Ball	Type -13	Polyamid Load Ball	Type -14	Stainless Steel Load Ball	Type -15/-16
Temperature °C	Factor fT	Temperature °C	Factor fT	Temperature °C	Factor fT
< 100	1,0	< 30	1,0	< 100	1
125	0,9	40	0,9	125	0,9
150	0,8	50	0,8	150	0,8
170	0,7	60	0,7	170	0,7
200	0,5	70	0,6	200	0,5
250	n/a	80	0,5	250	n/a

Notes:
Maximum temperature for stainless steel “type -15” with no seal is 200°C. Normally a high temperature grease to lubricate the small balls at high temperatures can be added. Normally only complete stainless steel “type -15” units without seal (NS) for high temperatures applications will be offered.

Conveying Speed

Maximum recommended conveying speed is 1 metre per second for steel load balls and 0,25 metres per second for polyamid.

Seals

Seals do help to resist ingress of dirt and swarf. They can be omitted on request. Woollen felt seals fitted as standard.

Breakaway Coefficient of Friction

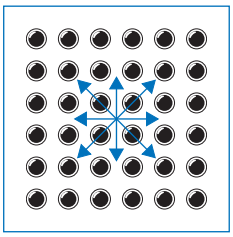
The average breakaway friction for new ball units containing steel balls in a good working environment is 0,01 to 0,015 (1% to 1,5% of the load) and 0,02 to 0,025 (2% to 2,5%) for units with felt seals.

Ball Tables

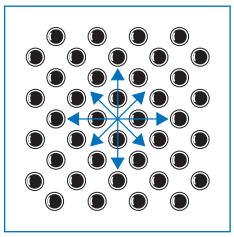
Blue arrows indicate ideal movement.

Quantity Calculation

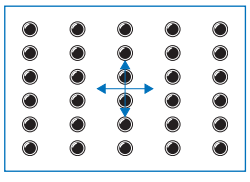
The weight of the article to be conveyed should be divided by 3. The result will give the maximum load any single ball will bear. On any accurately levelled or flexible surface, a number greater than 3 may be used. The surface hardness and condition of the article should be considered to avoid ball unit penetration.



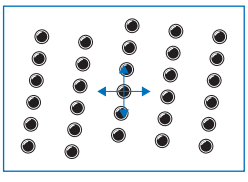
Square pitch



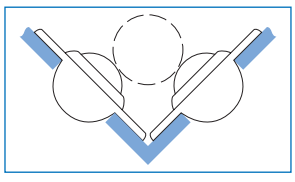
Diamond pitch



Elongated pitch



Elongated diamond pitch



Vee Location

Spacing
The pitch is calculated by dividing the narrowest dimension by 3,5. I.e. if the narrowest dimension is 350 mm divided by 3,5 = 100 mm pitch between ball centres. This ensures 3 ball units are always beneath the narrowest dimension of the load at any one time.

Applications
There are many possible applications for ball transfer units, where loads need to be moved smoothly, precisely and with minimum effort in any direction. Some typical applications include cargo and baggage handling, assembly lines, as a castor, machine loading, sliding-door systems, machine tables, etc. Alwayse not only advise and supply ball units, but also regularly design and manufacture complete assemblies ready for customers to use.

Quality
We have a policy of continually improving the product range with new innovative and creative ideas using the latest CNC machinery and production/inspection methods. Our specially designed ball unit test machine, regularly used to test production units, together with many years of research and experience,
ensures world-class performance.

Consultation
We provide a completely free technical advice service. We can help you select not only the most suitable ball unit for your application, we can advise on every aspect of layout, design, manufacture and maintenance of your installation. We strongly recommend you take advantage of this service.

Order
1) It is generally only necessary to quote the Product Reference N umber (i.e. 1009, 1019 or 530-0) and the Material Type (i.e. Type -13, -14, -15 or -16).
2) There are however instances where more information is required.

a) Where applicable the length of thread (dimension N) and the spring washer diameter (dimension W), see pages 10-11 and 14, also need to be indicated, e.g. 3001-13-25 mm and 3019-22-15. Part Nr. Type Material Thread length (mm) 3001- 13- 25 Part Nr. Type Construction Type Material 3019- 22- 15

Part Nr.	Type Material	Thread length (mm)
3001-	13-	25
Part Nr.	Type Construction	Type Material
3019-	22-	15

b) Also, if applicable, quote the special specification code. For example,
- NO (no oil)
- N S (no seal)
- N B (polyamid ball)
- PB (phenolic load ball)
- DE (dirt exit hole)
- SI (solid steel inner ring)
- Black phenolic balls are available in ø 19 mm and ø 25,4 mm; load balls only.