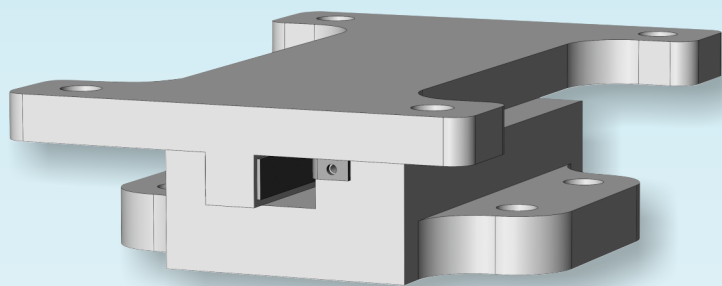




F

Fixed & Guided Bearings



Description

F Series is a range of structural bearings for locating structures. They are designed to react only horizontal loads. Fixed and guided bearings are available as standards for loads up to 2352 kN. The bearings fully meet the requirements of BS 5400 Section 9. They are manufactured to meet quality standards applicable throughout the world.

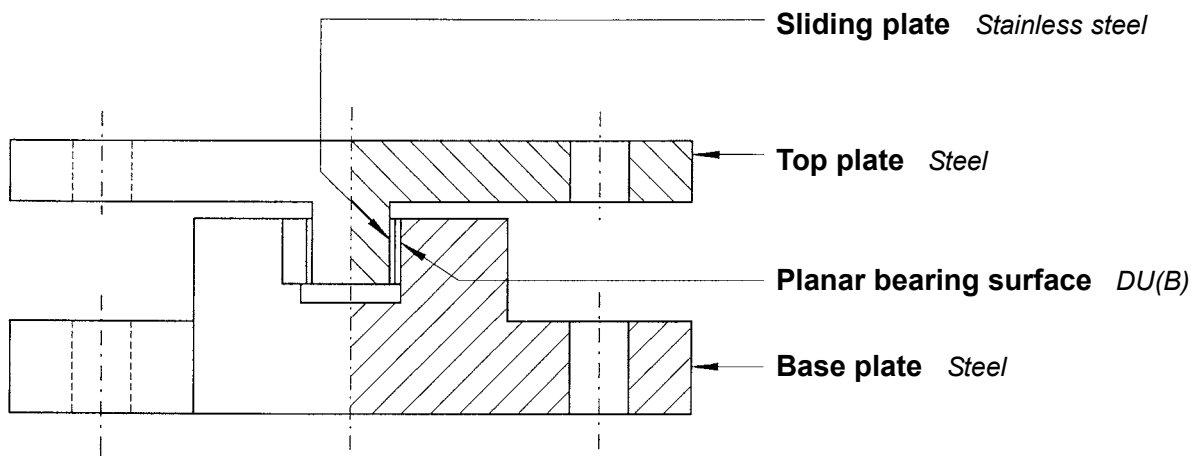
Bearing types

F series bearings are available in three forms -

- 10F** Fixed
- 11G & 21F** Free to move in one horizontal direction

In addition all bearings can accept compressive movements of up to 3mm which facilitates their use with bearings (such as elastomeric types) which deflect noticeably under load.

Typical 21F details



The sections through the top plate and base plate are staggered.

Attachment

All three types, **10F**, **11F** and **21F**, have the facility for bolted attachment of the base to sockets, or an independent attachment plate. **10F and 21F top plates can also be fixed by way of bolts to sockets or an independent attachment plate.**

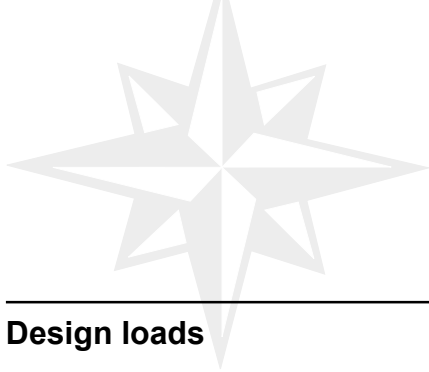
The 11F bearing has been designed such that the top plate takes the form of a tang permanently embedded in infill concrete between adjacent precast elements.

Support and Installation

Important - See pages 21 - 23 for Installation and Maintenance.

The bearings are fitted with transport brackets which maintain a clearance for vertical movement. These must be removed after installation.

Concrete stress



Where suitable reinforcement has been provided the allowable concrete stress is dependent on the relative dimensions of the bearing/structure interface, the total support area, and the characteristic strength of the concrete. The stress on the structure should therefore be checked to ensure that it is acceptable.

With these bearings it is important to ensure that the sockets are embedded in structural concrete not less than the depth indicated on page 6 and in the case of 11F types that the tang is embedded to dimension H on page 5. A material of adequate strength must be used in conjunction with suitable reinforcement to resist bursting and tensile forces.

Design loads

The designation of loading varies from country to country. These bearings are designed to BS5400 limit state loads. It may be assumed that the Serviceability Limit State load may be substituted for the maximum load in a working stress design.

Rotation

All the bearings can rotate at least 0.01 radians about the transverse horizontal axis. The **10F** can rotate at least 0.01 radians about all other axes.

Movement

The The dimensions for the **11F & 21F** bearings allow for a longitudinal movement of $\pm 50\text{mm}$. Additional movements in increments of 50mm total can be supplied. **We will be pleased to advise but this will change the top plate dimensions.**

NB 11F & 21F bearings should not be used where movement at right angles to the guided direction is required.

Designation of part no.

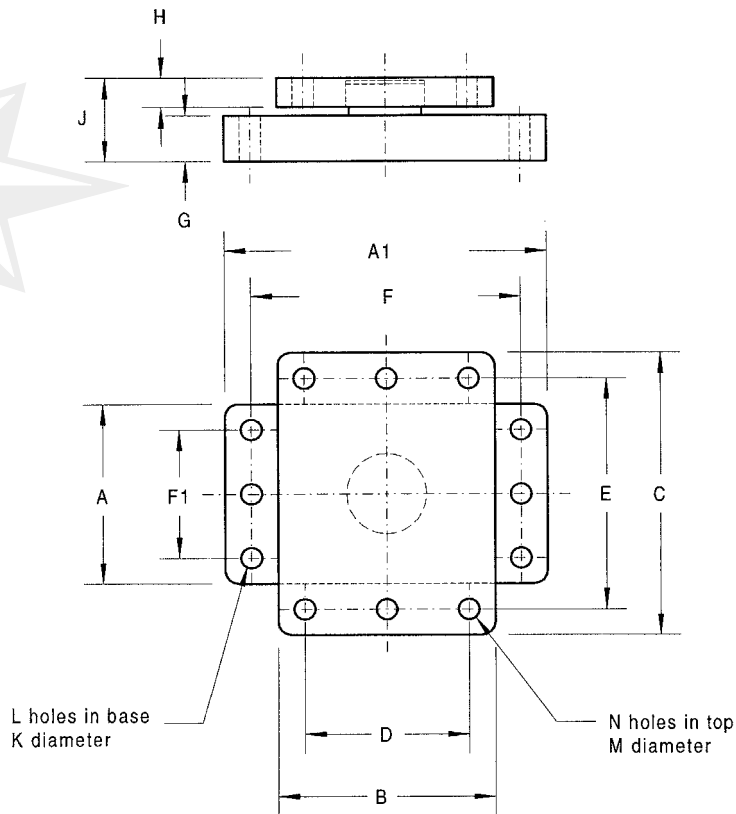
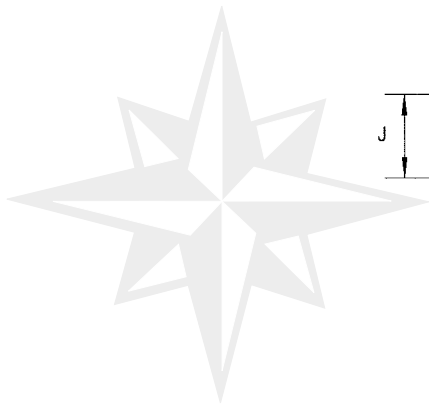
The part number of a bearing is simply built up as below –
eg.

	Type	Maximum Working Load (kN)	Movement Longitudinal (mm)	Fixings Top	Fixings Base
a	10F	250		S	S
b	11F	250	100	N	S
c	21F	250	100	B	S

The basic part number is shown in the tables on pages 4 and 5. Select the type of attachment required and the smallest bearing in that range which can accommodate the specified operating conditions.

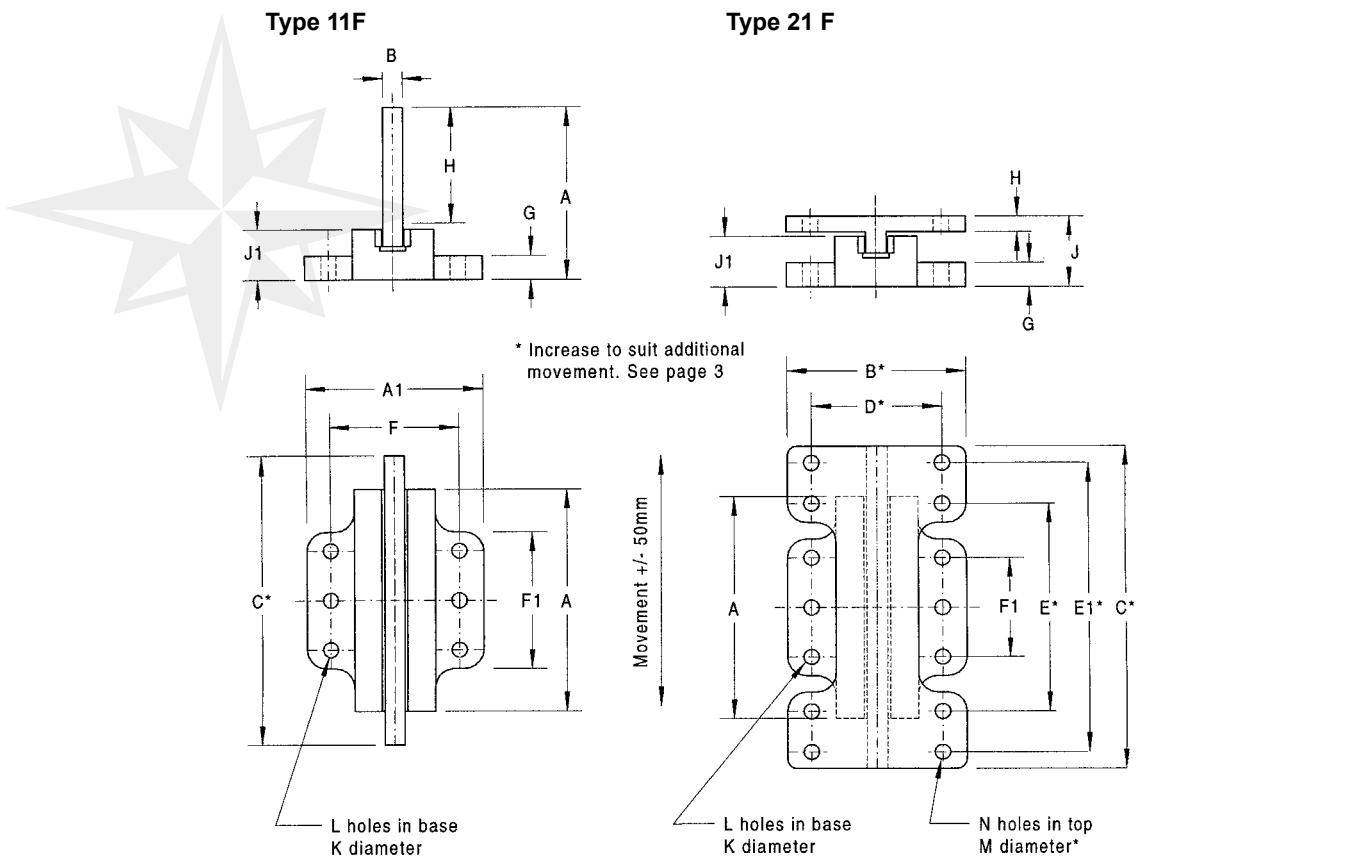
e.g. For **a** above the full part number would be **10F25/SS**
b above the full part number would be **11F25/100/NS**
c above the full part number would be **21F25/100/BS**

'c' above denotes a guide bearing with bolted attachment to the top plate and bolts and sockets to the base plate. Maximum load capacity is 254kN SLS/420kN ULS and total movement capacity is 100mm.



Bearing Part no	SLS Load (kN)	ULS Load (kN)	Installation dimensions (mm)															Approx Weight *(Kg)
			A	A1	B	C	D	E	F	F1	G	H	J	K	L	M	N	
10F15	170	229	140	260	140	240	90	190	200	80	35	30	77	22	4	18	4	18
10F25	254	420	170	330	190	290	130	230	260	100	45	30	87	26	4	22	4	33
10F35	450	630	210	410	250	350	180	280	330	130	55	35	103	32	4	26	4	61
10F50	620	840	280	440	280	440	200	360	360	200	65	40	118	32	6	32	4	101
10F80	873	1100	280	490	330	440	250	360	410	200	70	45	128	32	6	32	4	126
10F120	1320	1720	360	640	440	520	360	440	540	260	80	50	144	38	6	32	6	234
10F170	1742	2352	410	750	530	610	430	510	640	300	95	55	165	44	6	38	6	368

* Excluding fixings



Bearing Part no	SLS Load (kN)	ULS Load (kN)	Installation dimensions (mm)												Approx Weight *(Kg)
			A	A1	B	C	F	F1	G	H	J	J1	K	L	
11F15	170	229	210	210	22	350	160	80	25	126	188	52	18	4	19
11F25	254	420	260	290	27	400	210	90	35	174	251	67	26	4	39
11F35	450	630	340	340	32	480	240	110	40	210	297	77	32	4	66
11F50	620	840	400	350	37	540	250	110	45	228	325	87	32	4	90
11F80	873	1100	470	370	42	610	270	210	50	245	360	105	32	6	138
11F120	1320	1720	580	430	52	720	320	230	60	310	435	115	38	6	235
11F170	1742	2352	660	490	57	800	360	280	70	366	511	135	44	6	347

Bearing Part no	SLS Load (kN)	ULS Load (kN)	Installation dimensions (mm)															Approx Weight *(Kg)		
			A	A1	B	C	D	E	E1	F	F1	G	H	J	J1	K	L		M	N
21F15	170	229	210	210	210	320	160	270	0	160	80	25	20	80	52	18	4	18	4	19
21F25	254	420	260	290	290	370	210	310	0	210	90	35	23	98	67	26	4	22	4	36
21F35	450	630	340	340	340	450	240	340	0	240	110	40	29	114	77	32	4	26	4	63
21F50	620	840	400	350	350	510	250	360	0	250	110	45	31	127	87	32	4	32	4	84
21F80	873	1100	470	370	370	680	270	440	620	270	210	50	33	147	105	32	6	26	8	135
21F120	1320	1720	580	430	430	790	320	500	710	320	230	60	43	167	115	38	6	32	8	228
21F170	1742	2352	660	490	490	890	360	570	800	360	280	70	61	206	135	44	6	38	8	368

* Excluding fixings

The fixings described below are designed to suit the requirements of F Series bearings.

Standard F Series fixings

By adding a two letter suffix to the bearing part number the type of fixing may be designated -

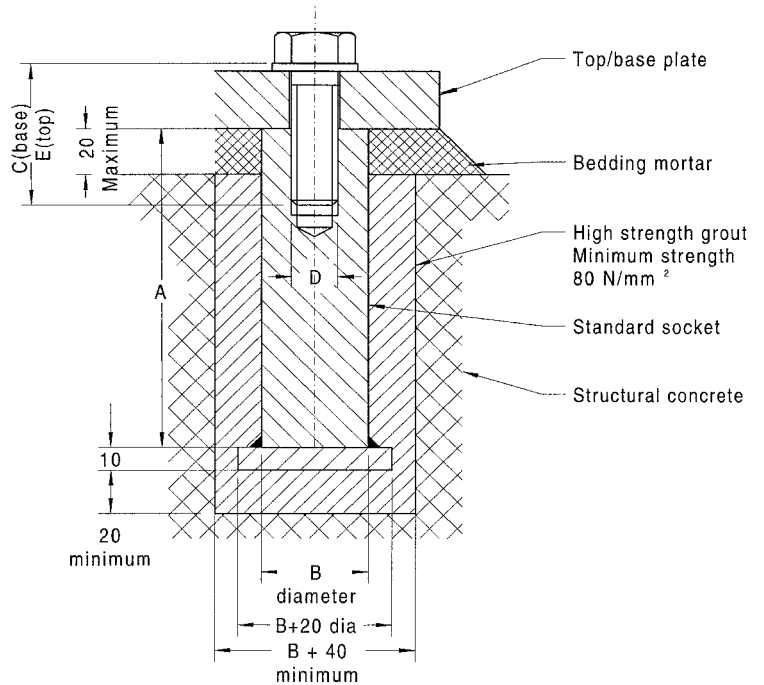
First letter - Top plate fixing
 Second letter - Base plate fixing

N - No fixings
B - Bolts and washers only
S - Bolts, washers & sockets

e.g. /BS signifies -
 B (top plate fixing) Bolts & washers
 S (base plate fixing) Bolts, washers & sockets

N.B. If standard F series fixings are not used, care should be taken to ensure that bolts can be fitted without dismantling the bearing.

Bolts are Hexagon Head to BS 3692 grade 10.9
 Sockets are steel to EN 10025 grade S275.



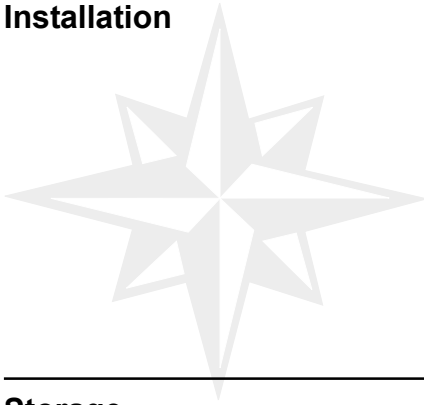
Bolts and Sockets 10F

Bearing Size	Base		Bolt		Socket		Top		Bolt	
	B	A	D	C	B	A	D	E		
15	50	170	20	70	40	140	16	60		
25	55	200	24	90	50	170	20	70		
35	70	240	30	110	55	200	24	80		
50	70	240	30	120	70	240	30	90		
80	70	240	30	120	70	240	30	100		
120	80	300	36	140	70	240	30	100		
170	105	360	42	160	80	300	36	110		

Bolts and Sockets 11F & 21F

Bearing Size	Base		Bolt		Socket		Top		Bolt	
	B	A	D	C	B	A	D	E		
15	40	140	16	50	40	140	16	50		
25	55	200	24	80	50	170	20	60		
35	70	240	30	90	55	200	24	70		
50	70	240	30	100	70	240	30	80		
80	70	240	30	100	55	200	24	70		
120	80	300	36	120	70	240	30	90		
170	105	360	42	140	80	300	36	120		

Installation



CONSIDER THE EFFECTS IF BEARINGS ARE NOT CORRECTLY INSTALLED

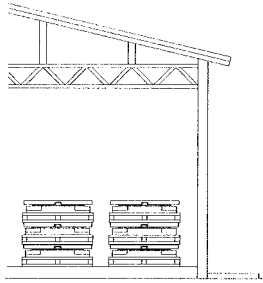
Our structural bearings are manufactured to close tolerances by skilled technicians working in clean conditions. To obtain the requisite performance from bearings it is imperative that they are properly handled at the work site and installed with the same care as when they were assembled in the factory. The following notes will assist those responsible for specifying and supervising the installation of structural bearings.

Please note that Ekspan are able to provide installation, supervision or training of personnel. A test paper can also be supplied to verify the understanding of installers.

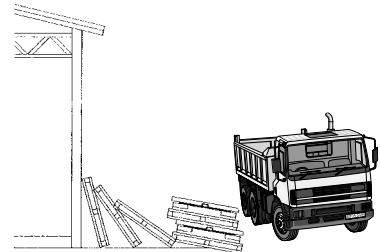
Bearings must be installed with precision to meet the bridge and bearing design criteria.

Storage

Our structural bearings are protected from contamination under normal working conditions by an efficient sealing system. Care should be taken in storage to prevent contamination and damage to the working surfaces.



Correct

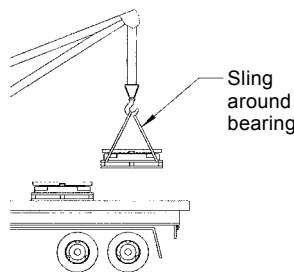


Incorrect

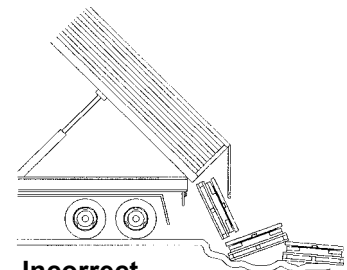
Handling

Robust transportation devices are fitted to all bearings to ensure that the components are maintained in their correct relative positions before and during installation. The devices are normally finished in red paint. Unless special devices have been specified, they should not be used for slinging or suspending the bearings beneath beams.

Due to unpredictable conditions, which may occur during transportation or handling on site, the alignment and presetting (if applicable) of the assembled bearing should be checked against the drawing. Do not endeavour to rectify any discrepancies on site. The bearing should either be returned to Ekspan or, where practical, an Ekspan engineer should be called in to inspect and reassemble. Bearings too heavy to be lifted by hand should be properly slung using lifting equipment.



Correct



Incorrect

Presetting

If bearings are required to be preset eg where once only large movements may occur during stressing operations, this should be specified as a requirement and should only be carried out in our works prior to despatch. Do not attempt this operation on site.

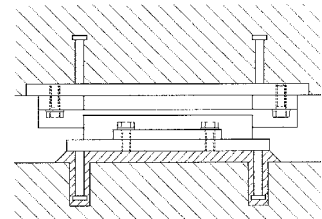
Bedding



Bearings must be supported on a flat rigid bed. Steel spreader plates must be machined flat and smooth to mate exactly with the bearings' upper and lower faces. Bearings may also be bedded on epoxy or cement mortar or by dry packing. Whichever system is preferred for the particular structure it is of extreme importance that the final bedding is free from high or hard spots, shrinkage, voids, etc.

Unless there is a specific design requirement, the planar surfaces must be installed in a horizontal plane. The correct installation of bearings is vital for the bearing performance. Costly repairs become necessary all too often due to inadequate specification or poor site supervision. The bearings should not be loaded until the bedding mortar has cured.

Fixing bearings to concrete using permanent anchor plates

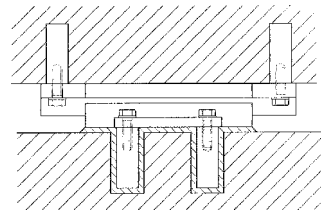


Cast-in-situ structures

Care must be taken to ensure that the bearings are not damaged by the formwork or contaminated by concrete seepage. The interface between the top plate and the formwork should be protected and sealed.

Owing to the loading effects of a wet concrete mass, the top plates should be propped to prevent rotation and plate distortion. Bearing top plates of PTFE sliding bearings are especially vulnerable in this respect.

Fixing cast-in-situ structures ensure that the bearing working surfaces are protected and supported to prevent distortion and rotation



Bearing removability

Where possible, bearings should be fixed in such a manner as to facilitate removal. Our bearings have generally been designed with this in mind. However, when selecting the bearing type preferred, the removability feature should be highlighted in your enquiry.

Removal of transport brackets

These brackets, normally painted red should only be removed when the bearing is properly installed and ready for operation.

Check list for the installation of bearings

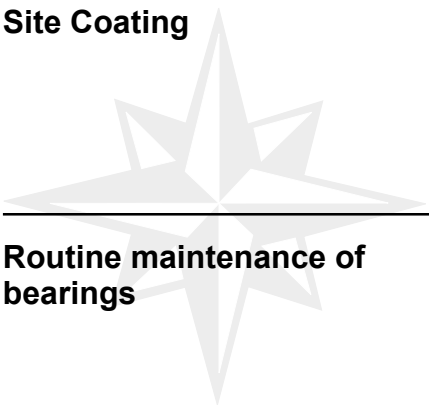
DO-

1. Handle carefully and where necessary with adequate craneage.
2. Store in a clean dry place.
3. Ensure that the bearings are installed in the correct location and orientation.
4. Ensure that the bearings are installed on a flat rigid bed before the design loads are applied.
5. Ensure that the fixings are uniformly tightened.
6. Complete any site coatings and make good paint damaged during handling and installation.
7. Protect working surfaces during the placing of in-situ concrete.
8. Keep the bearings and surrounding areas clean.
9. Remove any temporary transit clamps etc. before the bearings are required to operate.
10. Take special care to support top plates when casting in-situ concrete.

DO NOT-

1. Dismantle the bearing on site.
2. Leave bearings uncovered.
3. Attempt to modify without our approval.
4. Install without qualified supervision.

Site Coating



Care should be taken to ensure that working surfaces are not damaged in any site coating operation. After installation damaged coatings must be repaired irrespective of any call for site coatings.
Exposed fixing bolts should be protected after final tightening.
Any tapped holes exposed after removal of transportation brackets etc. (coloured red) should be sealed with self-vulcanizing silicone sealant.

Routine maintenance of bearings

1. Immediately following installation bearings shall be inspected to ensure that all aspects of 'Installation of bearings' have been adhered to and bearings shall subsequently be re-inspected not less frequently than every two years after their installation.
 2. Paint and /or other specified protective coatings must be maintained in good and efficient condition and free from scratches or chips. Any areas of the protective coating showing damage or distress must be rectified.
 3. Areas surrounding the bearings must be kept clean and dry and free from the adverse effects of external influences such as airborne debris or water/salt (for example emanating from leaking joints).
 4. The wearing surfaces of the bearing must be checked to ensure that they are continuing to operate efficiently.
 5. Fixing bolts must be checked for tightness.
 6. Any bedding material showing signs of distress or ineffectiveness must be replaced and the reason for its failure investigated and corrected.
 7. Routine inspections shall include a check that translational and rotational capacities of the bearing have not been exceeded and show no sign of being likely to exceed the requirements specified at the design stage.
-

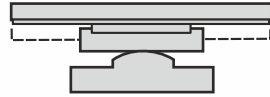
Sample Quality Bearing Specification Clauses - K Series Pot Bearings

- 1.01 The bearings should be designed in accordance with BS 5400 part 9 & EN1337 and be constructed from steel grade EN100025 S355 J2G3. *(HIGH QUALITY STEEL GOOD LOADING CAPACITIES)*
- 1.03 The sliding surface of the bearing must be fully welded to the top plate of the bearing. This prevents crevice corrosion de-lamination of the stainless steel ensuring bearing longevity. The stainless steel sliding surface should be mirror polished to a minimum of 8/1 P BS1449/ EN10088-2 or with a reflectivity of 48/55. Paint will be applied to overlap the welded area of the sliding surface so as to protect the area from the risk of corrosion. *(REDUCES CORROSION IN UNLOADED AREAS WHICH IS THE CAUSE OF MOST BEARING FAILURES)*
- 1.04 PTFE bearing surfaces shall be Virgin material with a dimpled surface and lubricated with silicon grease in accordance with EN1337-2. The PTFE shall be retained in the bearing by a machined recess. *(FRICTION IS AT A MINIMUM, LIFE IS EXTENSIVE AND THE PTFE CANNOT "CREEP")*
- 1.05 Guide sliding surfaces should also be fully welded and mirror polished. The wear surface of the guide shall be a mechanically restrained high load resistant material DU(B) in accordance with EN1337-2. *(THE LIFE OF BEARINGS IS EXTENDED WITH USE OF GOOD WEAR MATERIALS)*
- 1.06 Pot bearing pistons are machined with a tightly controlled tolerance between the pot and the piston. *(REDUCE EDGE PRESSURE EFFECTS ON RUBBER)*
- 1.07 The rubber pad in a pot bearing is to have a minimum of 2 brass rings, which should be sized to meet and fit tight to the pot wall. EN1337-5 *(THIS IS KEY TO ENSURE THAT THE RUBBER IS RETAINED IN THE POT - IF NOT THEN THE RUBBER MAY EXTRUDE UNDER LOAD)*
- 1.08 The rubber pad shall meet BS5400 part 9, EN 1337 and be Natural rubber with a hardness of 55 to 65 IRHD. It will be preformed with a recess on the to surface which allows the retaining rings to finish flush with the rubber. *(THIS MEANS THAT WHEN THE BEARING IS LOADED THERE ARE NO AIR GAPS TO CLOSE ENSURING THAT DATUMS ARE MAINTAINED)*
- 1.09 The rubber pad shall fit in the pot without need for deflection. Corners should be moulded in such a way as to ensure that the pad fits to the machined pot base. *(THIS ALSO REDUCES AIR ENTRAPMENT)*
- 1.10 The outer surfaces of the bearing will be blasted to SA 3 and have the contract specified paint system applied.

BRIDGE & INDUSTRIAL BEARINGS



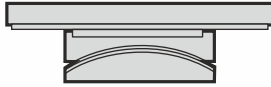
B Series Sliding Bearings
with elastomer base



D Series Line Rocker Bearings



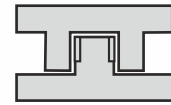
EA Series Sliding Bearings



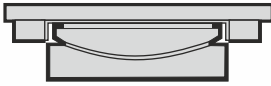
E Series Anticlastic Bearings



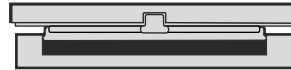
Elastomeric Bearings



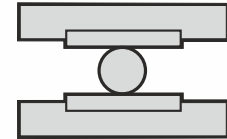
F & FE Series
Pin and Guide Bearings



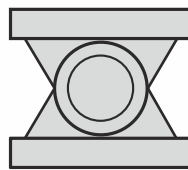
G & GE Series
Spherical Bearings



K & KE Series Pot Bearings



J Series Roller Bearings



Link Bearings

EXPANSION & SEAL TYPE JOINTS



Multi Element Expansion Joints



Roller Shutter Expansion Joints



Finger Type Expansion Joints



TF Expansion Joints



T-Mat Expansion Joints



TF B-75 and TF B-7
Expansion Joints



Single Element Expansion Joints



EC Seal Expansion Joints



ES Seal Expansion Joints



EW Seal Expansion Joints

A world wide service offering effective solutions in:-
Inspection • Design • Manufacture • Supply
Installation • Commissioning • Planned Maintenance

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E&OE



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