
APPLICATION AND INSTALLATION GUIDE

SKF VIBRACON



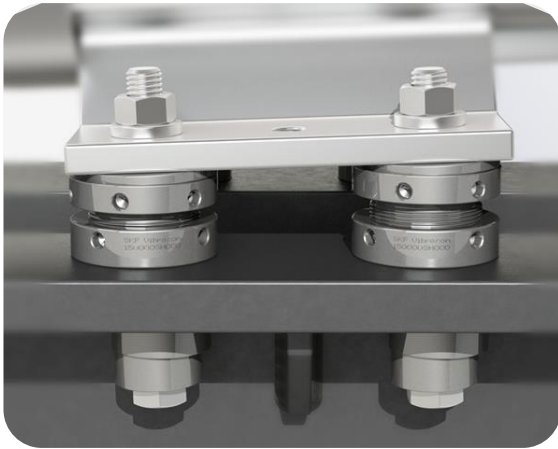
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BRAND TS

*Tools & Equipment for the industry
Rental, Sales, Service and Training*



1. Executive Summary



The SKF Vibracon chock is a universal re-adjustable steel chock. Universal refers to the fact that an SKF Vibracon chock can be used instead of rigid steel chocks, steel shims or epoxy resin. Re-adjustable refers to the possibility of re-adjusting the chock at every re-alignment action.

The name "SKF Vibracon" chock suggests that the chock can absorb vibrations like a resilient mount (vibration damper). We want to point out that the SKF Vibracon chock is absolutely **not** a resilient mount. The name has been derived from "**V**ibration **C**onducting" steel mount.

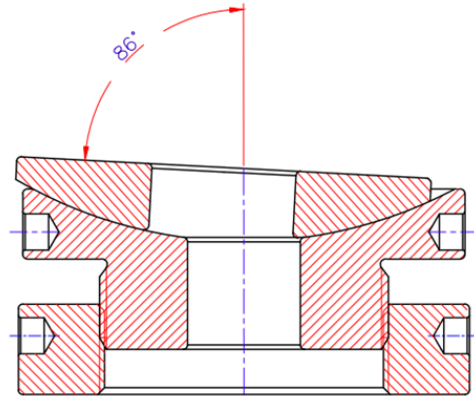
SKF Vibracon chock is a permanent, strong and re-usable mounting chock for all types of rotating and / or critically aligned machinery. The SKF Vibracon chock is a mechanically stiff chock that makes accurate mounting and alignment simple and quick.

- The SKF Vibracon chock advantages are:
- Eliminates "Soft Foot"
 - Save installation time and costs
 - Self-leveling
 - Re-adjustable / Re-usable
 - Chock fast, no curing time required
 - No special installation skills required
 - Green solution

The SKF Vibracon chock has many configurations and material options to fulfill specific technical requirements, and is being used in end user applications as well as service projects.

The principle of the SKF Vibracon chock is:

- A self-leveling spherical top plate
- An adjustable center plate
- A rigid bottom plate



This configuration is re-adjustable in height and accommodates angular differences up to 4°.

In this application guide we will inform you about all aspects of the SKF Vibracon chock.

If you have further questions or if you need additional information do not hesitate to contact us through: vibracon@skf.com.

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2. Markets

Although originally designed for industrial use the SKF Vibracon chock became better known when applied in the marine environment.

However, the product is being applied in many more industries. When components are pre-mounted on a steel base frame, a so called skid, the necessity for initial, intermediate and final alignment is apparent.

Typical applications can be found in:

- Compressors
- Electric motors
- Industrial fans
- Industrial pumps
- Industrial transmissions
- Machine tools
- Marine / Navy
- Material handling
- Medical and health care
- Metals
- Mining, mineral processing and cement
- Oil and gas / Offshore
- Pulp and paper
- Railways
- Solar energy
- Traditional power
- Wind energy

Typical applicants are:

- OEMs
- Packagers
- Shipyards
- Service contractors
- EPC contractors

2.1 Typical applications and applicants

2.1.1 OEMs

Applications where a driver and a driven component are built on a sub-frame (skid).

OEMs like Wärtsilä, Caterpillar and Rolls Royce are standardized for the use of the adjustable steel chocks for chocking of the generator in their generator sets.



16CM32C Offshore Generator Set

Typical generator set application where the generator is aligned towards the engine and mounted on SKF Vibracon chocks.

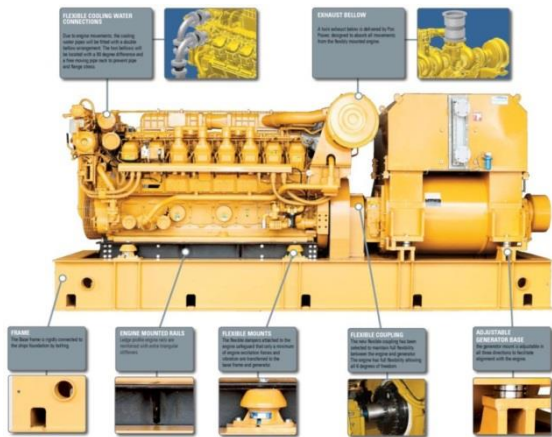


Pump set manufacturers where the electromotor is mounted on the SKF Vibracon chock.

2.1.2 Packagers in PowerGen

Power Generation is an important market for the SKF Vibracons. Applications can again be found in generator sets but also in gas and steam turbine installations. Many of the installations are skid built and will have a repeating alignment requirement during their life time.





Typical generator mounting in a generator set.

Other installations are mounted on a concrete base, which offer other opportunities for the use of SKF Vibracons.



SKF Vibracon chock mounted on concrete with an additional steel plate to reduce surface pressure on the concrete.

2.1.3 Packagers Oil & Gas

Skid built equipment create great opportunities for the use of the SKF Vibracon chocks. Final alignment can be done in the workshop for testing purposes. A skid has a certain flexibility and the SKF Vibracon chocks will simplify the final alignment after installation on site. Typical applications in this market are compressor and pump sets.



Crude oil pump set, engine and gearbox mounted on SKF Vibracon chock.



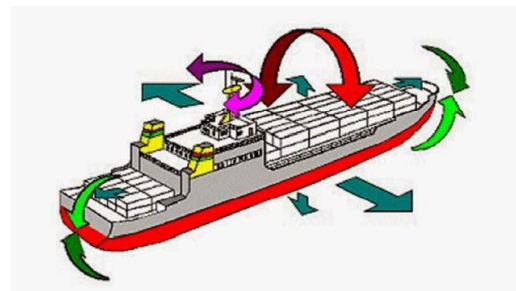
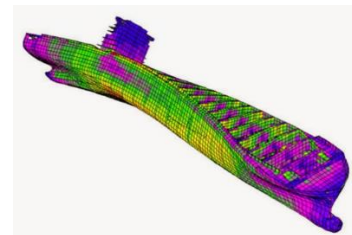
In addition to its functionality as a chock, the SKF Vibracon can also be used as a stopper.

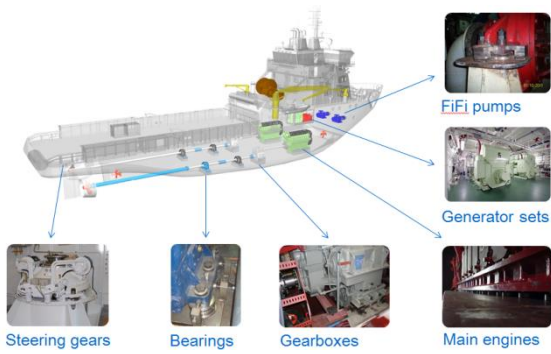


Re-adjustable fixed point to avoid reaming of fitted bolt holes.

2.1.4 Marine

In the shipbuilding and ship repair industry, the feature to (re)adjust the chock to optimize the alignment of rotating components onboard created a considerable market for the SKF Vibracon chocks. Due to the demanding requirements coming with the installation of the ships propulsion machinery, the type approvals from major marine classification societies contribute to the success of the SKF Vibracon in this market.





Machinery installed on a vessel, is subjected to hull deformation due to external forces on the structures. Proper alignment and mounting is therefore of paramount importance.

2.1.5 Navy

Navy applications are known for their extremely high requirements in terms of material choice, their performance and documentation. The SKF Vibracon knowledge has been applied in numerous applications where tailored solutions have been used. The shock tests performed as well as the MIL-S-901 compliance guarantees suitability in the most demanding environments. For example, special materials like non-magnetic K-Monel is being used for mine sweepers and is available upon request.

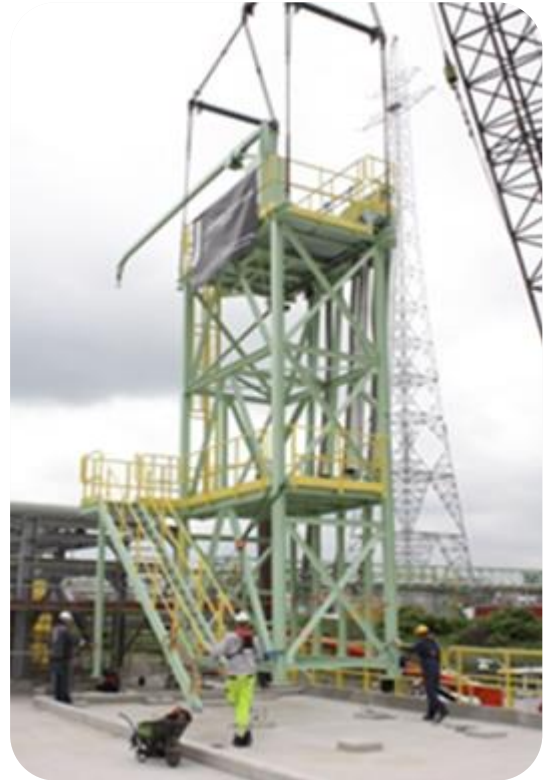


Tailored chock for naval use.

2.1.6 EPC

Engineering, Procurement & Construction companies are looking for time reduction on the plant. For this reason, more and more equipment has to be delivered in a package / as a skid.

For fast installation the SKF Vibracon chock is used between the skid and the main construction of the plant.



Reducing alignment time on site



Chocking of the structure



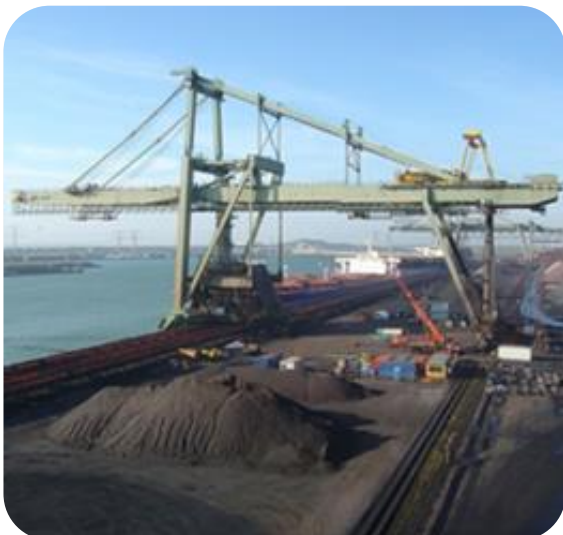
Preparation of compressor set chocking



Compressor set chocked and mounted

2.1.7 Material handling

In mining applications, valuable minerals are extracted from the earth for further processing. This involves the basic technics like excavation, transport and dumping, all being executed by diesel, gas or electric powered equipment requiring proper mounting. The same requirement is there for harbor operations.



Harbor crane project



Exchange of electro motors



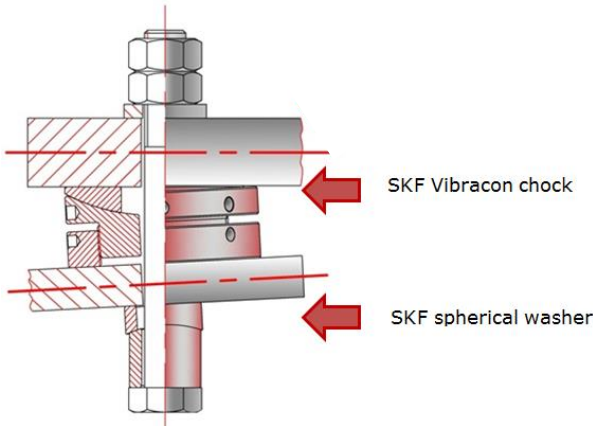
Details of the SKF Vibracon chock

3. SKF Vibracon Products



3.1 Technical Product description

3.1.1 What is an SKF Vibracon chock?



The SKF Vibracon chock is a rigid machinery mounting chock that can be easily and accurately adjusted. The chock has the ability to accommodate up to a 4° angular difference between component and the mounting base. The SKF Vibracon chock is installed within a short time-span, mainly without the need of expensive or invasive machining of the mounting base. The SKF Vibracon chocks' self-leveling and height-adjustment features eliminate a soft foot during the life cycle of the component.

A variety of adjustment tools for confined installation spaces are available.



See also the paragraph on Adjustment tools on page 20.

Unlike other chocking methods the installation procedure can be realized on a tight schedule and contributes to a longer life cycle of the component.

The SKF Vibracon chock has many advantages compared to other products such as epoxy resin and steel shims. The key advantages are listed below.

The SKF Vibracon chock advantages are:

- Eliminates “Soft Foot”
- Save installation time
- Self-leveling
- Re-adjustable / Re-usable
- Chock fast, no curing time required
- No special installation skills required
- Green solution

The SKF Vibracon chock: Quick, Easy, Accurate!



3.2 Materials

The SKF Vibracon chocks are available from stock in the following materials:

Standard

- Carbon Steel Surface Treated (DIN 1.1191 / 1.0570)
- Stainless Steel (DIN 1.4404)
- Carbon Steel (DIN 1.1191 / 1.0570)

Low Profile

- Alloy Steel Surface Treated DIN 1.7225

Other materials are available on request.

3.2.1 Carbon Steel – Surface Treated

SKF Vibracon treated chock is subjected to an enhanced corrosion protecting treatment, which makes them capable for applications in harsh environmental conditions. By means of nitro-carburizing, carbon is brought in the outer layer of the Vibracon which significantly increases the corrosion resistance. For average corrosive environments we advise the use of SKF Vibracon treated chocks. The treated version can be recognized in the article number when TR is a part of the number.



Standard carbon steel surface treated DIN 1.1191 / 1.0570

3.2.2 Stainless Steel

For aggressive environments (e.g. Off Shore and on deck applications) we advise the use of the Stainless Steel version of the SKF Vibracon. The stainless steel version can be recognized in the article number when SS is a part of the article number.



Stainless Steel (SS) DIN 1.4404 (AISI 316L)

3.2.3 Carbon Steel

Besides the standard range of treated and stainless steel products there is the option to choose for a non-treated standard SKF Vibracon chock as the economic version of the versions above. For non-aggressive environments (well shed and covered) we advise the use of non-treated SKF Vibracon treated chocks. Recommendation for enhanced corrosion protection is to use the SS or TR versions of the chock. The non-treated version can be recognized by lack of TR or SS in the article number. Thread, Concave & Convex surfaces are protected with SKF grease LGAF E3.



Standard carbon steel non - treated DIN 1.1191 / 1.0570

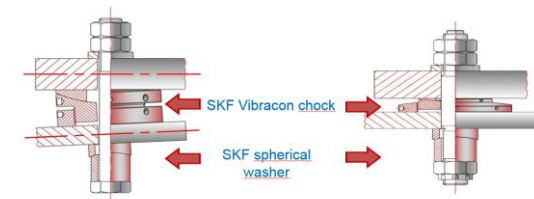
3.2.4 Alloy Steel – Surface Treated

The SKF Vibracon treated Low Profile chock offers an economic solution for repair projects or fixed design systems where expensive milled chocks, shims or epoxy resins were installed before.



Low-Profile (AS) surface treated DIN 1.7225

The SKF Vibracon treated Low Profile chock is designed for those applications where the chock height between the foundation and component has been established by the previous design and is limited to a certain available height.



For specific applications, there might be a requirement for other materials which can be supplied upon request.

3.3 Product designations

3.3.1 How to order

Standard SKF Vibracon models are available in the SKF systems with the following designations:



SKF Vibracon - Original		
		
Carbon Steel	Carbon steel – Anti-Corrosion Surface Treated	Stainless Steel
Designation	Designation	Designation
	SM 10 -CSTR*	SM 10 -SS*
SM 12 -CS	SM 12 -CSTR	SM 12 -SS
SM 16 -CS	SM 16 -CSTR	SM 16 -SS
SM 20 -CS	SM 20 -CSTR	SM 20 -SS
SM 24 -CS	SM 24 -CSTR	SM 24 -SS
SM 30 -CS	SM 30 -CSTR	SM 30 -SS
SM 36 -CS	SM 36 -CSTR	SM 36 -SS
SM 42 -CS	SM 42 -CSTR	SM 42 -SS
SM 48 -CS	SM 48 -CSTR	SM 48 -SS
SM 56 -CS	SM 56 -CSTR	
SM 64 -CS	SM 64 -CSTR	

* primarily for sample and demonstration purposes

The SKF Vibracon low profile is available as Surface Treated model only.

SKF Vibracon - Low Profile vibracons

Alloy Steel – Surface Treated
Designation
SM 16 LP-ASTR
SM 20 LP-ASTR
SM 24 LP-ASTR
SM 30 LP-ASTR
SM 36 LP-ASTR
SM 42 LP-ASTR

3.3.2 Material comparison



3.4 Technical features and advantages

The SKF Vibracon chock has many configurations and material options to fulfil technical requirements, in end user environments and to reduce production line costs.

With the Vibracon chock no curing time is needed as with epoxy resin, it eliminates the trial and error alignment process characteristics for the “mill and shim” method and adjustability during the life cycle of the machinery.

This remainder of this paragraph will list the technical benefits.



16CM32C Offshore Generator Set

3.4.1 Soft foot correction

No parallel or angular soft foot problems, even when the foundation is twisted. Angular soft foot proves a challenge for every alignment engineer. Thanks to

the spherical top plate of the Vibracon this potential risk can be eliminated.



Angular soft foot: bent foot



Angular soft foot: angled base



Parallel soft foot: short foot

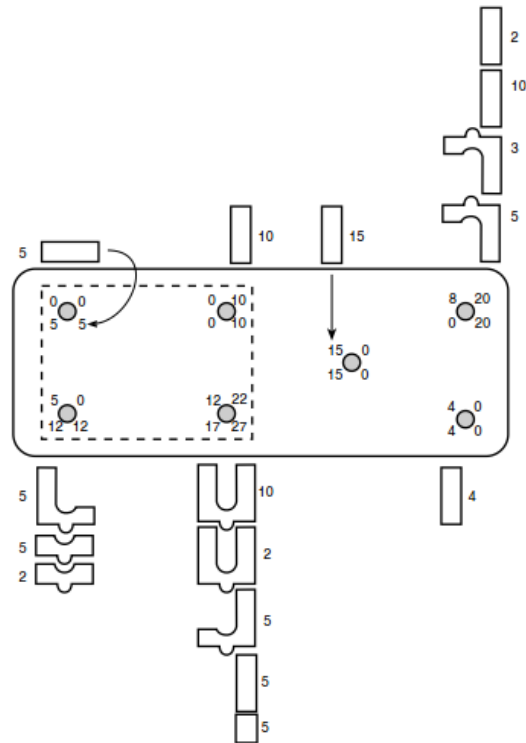
3.4.2 No machining of the base frame required

Machining of the foundation is a considerable cost, even when done in-house. When the SKF Vibracon installation guidelines are met, these costs can be reduced or eliminated.



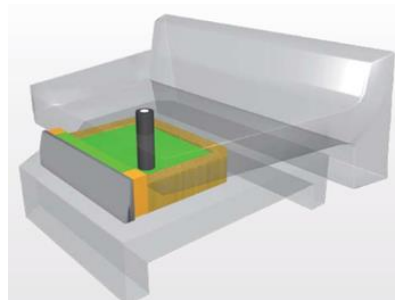
3.4.3 No on site problems to arrange or install shims.

Especially in case of angular soft foot, the use of cut or peel-off shims can be the cause of insufficient support area.



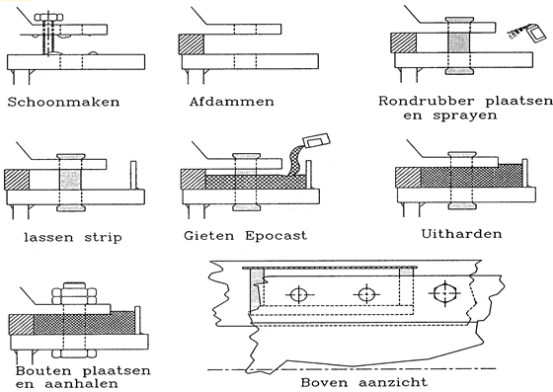
3.4.4 Environmental friendly and safe compared to epoxy solutions

Epoxy solutions generally consist of two components consisting of chemical nature. Transport, storage and application provide a certain risk which can be eliminated when using SKF Vibracon chocks.

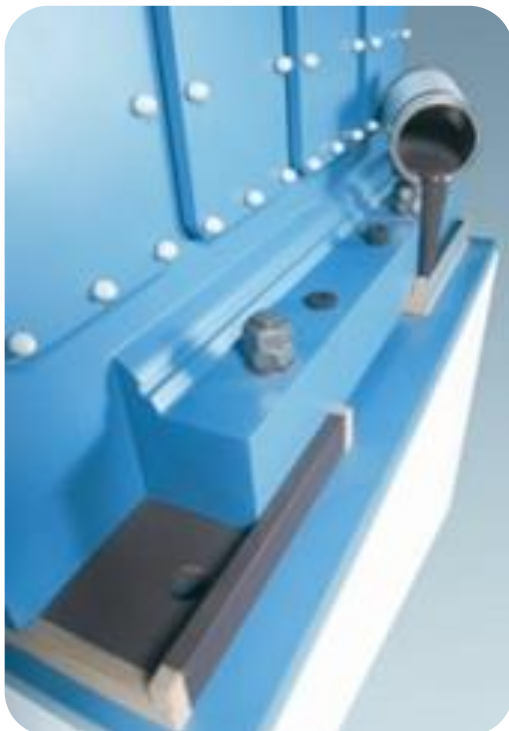


3.4.5 No preparation and curing time like epoxy resin chocks.

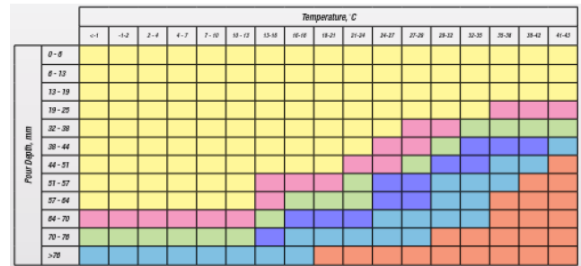
Installing machinery on epoxy compounds or grouts consists of a time-consuming procedure from preparation to application to verification. When time is of the essence, SKF Vibracon will ensure a perfect result in a fraction of the time.



15 °C	36 hours
21 °C	24 hours
26 °C	16 hours
32 °C	11 hours



3.4.6 No special installation skills required



- no reduction
- 1/4 reduction
- 1/2 reduction
- 3/4 reduction
- Full reduction
- Layered Pours

Note: Because of many variables of chocking area, such as size, thickness, metal temperature, heat diffusion and so on, the amount of curing agent used will be different. The service engineer will make the decision of how much curing agent should be used accurately and in accordance to the specific condition. The table above is for reference only. The detailed and correct mixture ratio should be improved during practice. The best temperature for pouring of epoxy resin is 20°C to 25°C.

3.4.7 No time-consuming fitting and grinding of rigid steel chocks

The application of steel chocks or steel liners is a specialist's job. Not only due to the fact that this procedure consists of trial and error (measurement and correction, blue-fitting and grinding) until the steel chocks provide sufficient contact area with the components' feet.



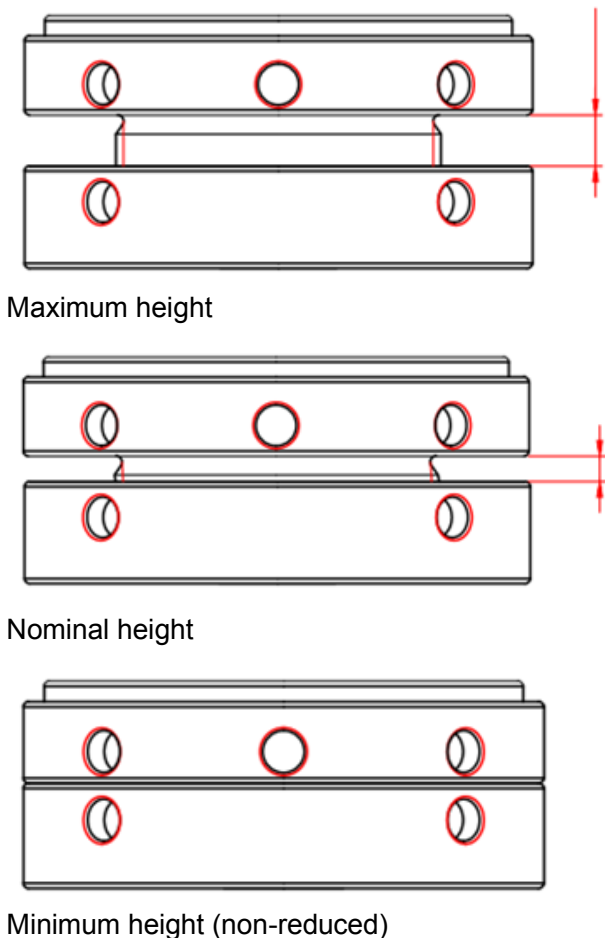
3.4.8 Saving on quayside costs

In marine newbuilding applications chocking can be carried out when the ship is still on the slipway or in the drydock, the alignment check and (if required) realignment has to be carried out after the ship has been launched.



3.4.9 Re-adjustable

SKF Vibracon provide the ultimate flexibility when the nominal height is considered in design phase.



3.4.10 Combined solutions

In combination with the SKF laser alignment equipment, alignment time can be reduced by 50%.



3.4.11 Complete product range

The SKF Vibracon product range offers a solution for every application ranging small industrial applications with limited chock height to large power plant machinery. From a chocking height, as low as 0.05 mm up to 250 mm and beyond, there always is a fitting solution.



3.4.12 Spot facing when needed

In case the foundation top plate is of unsatisfactory quality local machining can be done with the SKF PAT machining tool.



3.5 Commercial advantages

The SKF Vibracon chock is the most economical means to establish a perfect mounting plane within minutes and it will provide a repeated benefit for production or service managers.

3.5.1 Availability from stock

All frequently sold SKF Vibracon models are available from stock in order to guarantee delivery times are kept to a bare minimum.

3.5.2 The need for global availability

The globalization trend has increased the need of high global availability. Just-in-time concepts together with multinational production and assembly put high demands of a highly available distribution chain of components. SKF Vibracon as part of the SKF range of products offers just that. A direct contact inside SKF and local availability.

3.5.3 Engineering support

A dedicated engineering team makes sure that for every chocking challenge a suitable solution is proposed. Often this will result in application of a

standard product, sometimes more customization is required to make the solutions fit for purpose.

3.5.4 The need for precise and quick machine installation in a limited time frame

To avoid noise and vibrations it is critical to have the machinery optimally aligned in hot running condition. Optimal alignment has a positive influence on the wear and tear inside the machinery while reducing energy losses and fuel consumption. With the SKF Vibracon chock the optimal alignment can be achieved in matter of minutes so that shafts are operating in the optimum position.

3.5.5 The need for quick re-alignment onsite

Whenever due to, for example, transport the alignment needs to be optimized, the SKF Vibracon chocks contribute to easily and quickly correct the misalignment. This corrective activity needs to be precise, repeatable, easy and fast. This is to make sure the machinery is out of operation as short as possible and without a need for intensive or specialist labour. With the SKF Vibracon becoming adjustable as soon as the bolts tightening forces have been released, the intervention can be done in a short time span.

3.5.6 The need to reduce unplanned failures – To secure vital uptime.

The SKF Vibracon chocks are tightened with decent forces so that the SKF Vibracon will remain in the same position during operation of the machinery. The SKF Vibracon chock has the features from a rigid arrangement combined with the re-adjustable feature to adjust its heights afterwards.

3.5.7 The need of compact and maintenance free designs.

By introducing the SKF Vibracon Low Profile version the SKF Vibracon chock can also be used in reduced chocking heights starting at 20 mm. This is also helpful in case of conversion from an epoxy grouted situation to a re-adjustable SKF Vibracon.

4. Design instructions

4.1.1 Design Instruction Vibracon

In general, we advise you to follow the machine designer’s rules of foundation bolts. If for example an E-motor should be secured with M36 foundation bolts, it will be safe to use SM 36 Vibracon chocks. In order to guarantee suitability, it is always possible to request a detailed calculation of the size of chocks. SKF Maintenance Products has a software developed for calculating the chock size and bolt data.

The method for determining the size of elements is based on the calculation of two forces:

$$F_{\text{weight}} = \frac{M \times 9.81}{n \times 1000} \quad (1)$$

$$F_{\text{torque}} = \frac{P}{R \times W \times 0.5 n} \times \frac{60000}{2 \times \pi} \quad (2)$$

Where:

- F_{weight} = Force due to the weight of the machine (kN)
- F_{torque} = Force due to the reaction torque of the machine (kN)
- M = Mass (kg)
- n = Number of elements (use all bolt holes, unless machine manufacturer has given his approval to reduce the number of bolts)
- P = Power (kW)
- R = Revolutions (rpm)
- W = Width of foundation, measured between bolt holes (mm)

When the chock dimension has to be calculated for a gearbox, it is preferred that the gearbox manufacturer submits the data for the maximum and minimum force on each bolt position.

If the gearbox manufacturer is not able to give these figures SKF Maintenance Products can calculate these based on introducing a thrust force factor in combination with a tilting line.

The total machine load on the element is now:

$$F_{\text{vibracon}} = S \times (F_{\text{weight}} + F_{\text{torque}} + F_{\text{thrust}}) \quad (3)$$

Where S is a safety factor which is:

- 1.5 for non-reciprocating machinery like generators, E-motors and gearboxes.
- 2 for reciprocating machinery like diesel engines and reciprocating compressors.

After we have determined the machine load on the element it is possible to select a **minimum** size of SKF Vibracon.

Very Important: If the size of the SKF Vibracon chock is smaller than the corresponding size of the bolt which the manufacturer has determined, then please select the chock that fits to this bolt size.

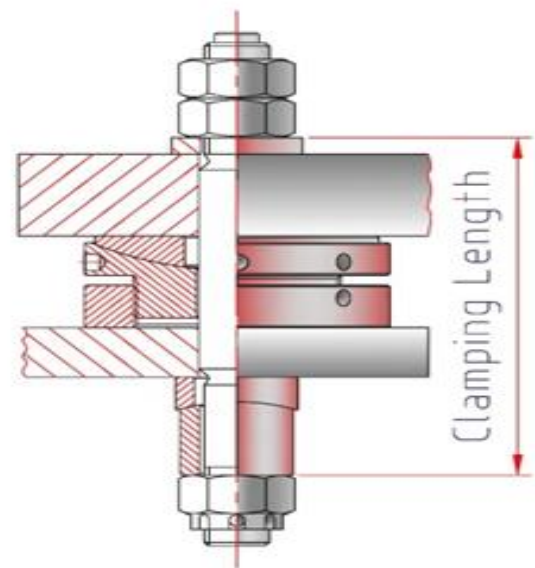
4.1.2 Design instruction bolt torque and length

We advise to use 8.8 graded bolts, yield strength > 630 N/mm², in Vibracon® applications.

We advise to ensure that the foundation bolt has a minimum elongation of at least 0.20 mm.

There are several alternatives to get enough elongation in the foundation bolt, the commonly used are mentioned below:

1. Creating enough clamping length by using an extension sleeve;
2. Reducing the shank diameter;



The clamping length is the total distance between bolt head and nut, this distance is equal to the sum of:

- Machine foot thickness (bed plate thickness)
- Final Vibracon® height
- Foundation thickness (top plate thickness)
- Extension sleeve height (alternatively the length of the spherical washer)

While there is a correlation between bolt size and bolt elongation, the following table will guide to the required tightening torques and minimum required clamping length per bolt size. As a rule of thumb the minimum clamping length should be 5 times the bolt diameter.

SKF Vibracon model	Bolt size (M)	Tightening Torque (Nm)*	Required clamping length** (mm)
SM 12 -CS/ -CSTR/ -SS	12x1,75	85	158
SM 16 -CS/ -CSTR/ -SS	16x2	215	144
SM 20 -CS/ -CSTR/ -SS	20x2,5	420	144
SM 24 -CS/ -CSTR/ -SS	24x3	730	142
SM 30 -CS/ -CSTR/ -SS	30x3,5	1460	140
SM 36 -CS/ -CSTR/ -SS	36x4	2570	137
SM 42 -CS/ -CSTR/ -SS	42x4,5	4125	136
SM 48 -CS/ -CSTR/ -SS	48x5	6210	135
SM 56 -CS/ -CSTR/ -SS	56x5,5	10035	131
SM 64 -CS/ -CSTR/ -SS	64x6	15165	128

The SKF Vibracon is equipped with a bolt hole that can accommodate larger bolts. Below an identical overview where one bolt size bigger has been selected.

SKF Vibracon model	Bolt size (M)	Tightening Torque (Nm)	Required clamping length* (mm)
SM 12 -CS/ -CSTR/ -SS	14x2	110	194
SM 16 -CS/ -CSTR/ -SS	18x2,5	270	165
SM 20 -CS/ -CSTR/ -SS	22x2,5	500	159
SM 24 -CS/ -CSTR/ -SS	27x3	890	167
SM 30 -CS/ -CSTR/ -SS	33x3,5	1740	156
SM 36 -CS/ -CSTR/ -SS	39x4	3000	149
SM 42 -CS/ -CSTR/ -SS	45x4,5	4990	137
SM 48 -CS/ -CSTR/ -SS	52x5	7170	148
SM 56 -CS/ -CSTR/ -SS	60x5,5	10360	156
SM 64 -CS/ -CSTR/ -SS	68x6	16320	143

**For bolts grade 8.8 with slightly oil lubricated ISO metric screw thread and coarse pitch the below table will provide the tightening torques and clamping lengths.*

SKF Maintenance Products recommends the use of so called spherical washers, of which the final height will be determined after the alignment has been performed, to ensure 100% mating surface of bolt head and nut mating surface to prevent bending stresses in the bolt connection. If spherical washers are used ensure yourself that the mating surfaces are convex / concave instead of convex / conical!



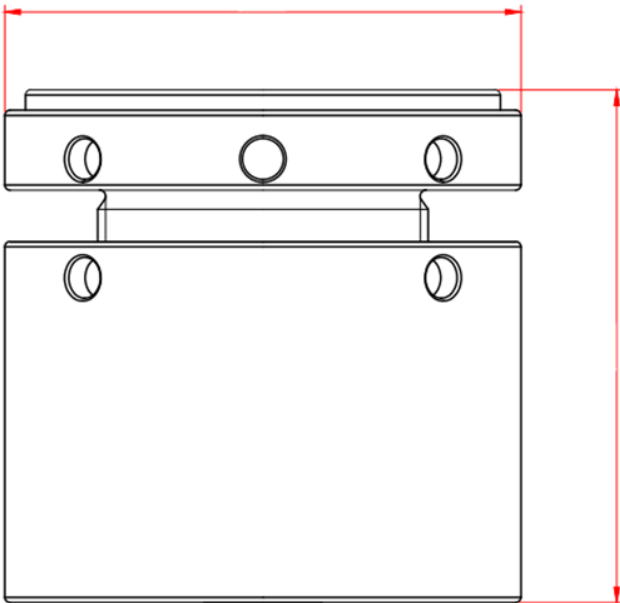
5. Extended Vibracon models


In cases where the available chock heights require an extended SKF Vibracon solution there are several options to choose from. There is the option to use an extended SKF Vibracon chocks as well as the application of Additional Bottom Rings.


5.1.1 Extended bottom ring

The from SKF recommended solution is the use of an extended SKF Vibracon element with an extended bottom ring. The main benefit of this product range is the limited number of mating surfaces.

These types of SKF Vibracon chocks are available in Surface Treated and Stainless Steel.



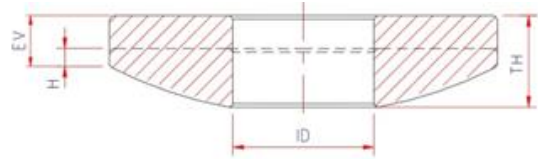
SKF Vibracon Extended models - Surface Treated				
				
Designation	Min height (mm)	Max. height (mm)	Min height (inch)	Max. height (inch)
SM 16				
SM16CST42-59	42	59	1,65	2,32
SM16CST56-80	56	80	2,20	3,15
SM 20				
SM20CST47-64	47	64	1,85	2,52
SM20CST61-92	61	92	2,40	3,62
SM20CST83-100	83	100	3,27	3,94
SM 24				
SM24CST54-75	54	75	2,13	2,95
SM24CST72-111	72	111	2,83	4,37
SM24CST108-120	108	120	4,25	4,72
SM 30				
SM30CST58-78	58	78	2,28	3,07
SM30CST74-110	74	110	2,91	4,33
SM30CST104-140	104	140	4,09	5,51
SM 36				
SM36CST63-83	63	83	2,48	3,27
SM36CST79-115	79	115	3,11	4,53
SM36CST110-160	110	160	4,33	6,30
SM 42				
SM42CST68-88	68	88	2,68	3,46
SM42CST84-120	84	120	3,31	4,72
SM42CST116-184	116	184	4,57	7,24


SKF Vibracon Extended models – Stainless Steel				
				
Designation	Min height (mm)	Max. height (mm)	Min height (inch)	Max. height (inch)
SM 16				
SM16SS42-59	42	59	1,65	2,32
SM16SS56-80	56	80	2,20	3,15
SM 20				
SM20SS47-64	47	64	1,85	2,52
SM20SS61-92	61	92	2,40	3,62
SM20SS83-100	83	100	3,27	3,94
SM 24				
SM24SS54-75	54	75	2,13	2,95
SM24SS72-111	72	111	2,83	4,37
SM24SS108-120	108	120	4,25	4,72
SM 30				
SM30SS58-78	58	78	2,28	3,07
SM30SS74-110	74	110	2,91	4,33
SM30SS104-140	104	140	4,09	5,51
SM 36				
SM36SS63-83	63	83	2,48	3,27
SM36SS79-115	79	115	3,11	4,53
SM36SS110-160	110	160	4,33	6,30
SM 42				
SM42SS68-88	68	88	2,68	3,46
SM42SS84-120	84	120	3,31	4,72
SM42SS116-184	116	184	4,57	7,24

5.1.2 Extended top plate for Vibracon Low Profile

In case the maximum element height is not sufficient when installing a component on Vibracon Low Profile chocks, the extended top plate can be ordered. During installation, the original top plate of the Vibracon Low Profile should be removed and replaced by the Extended Top Plate.

This option is applicable to SKF Vibracon Low Profiles only applicable when there is a preference for having a maximum 3 component chock.

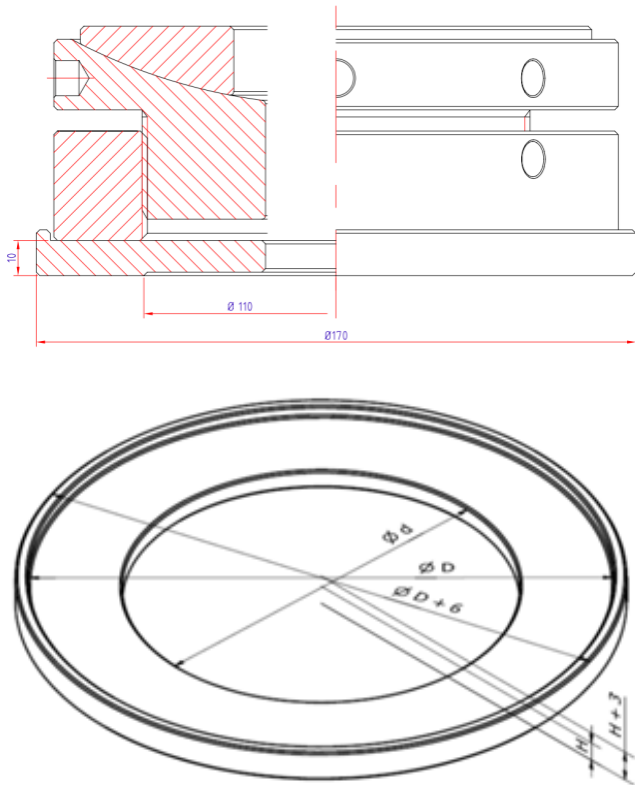


SKF Vibracon Extended Top plates for Vibracon Low Profile				
				
Designation	Min height (mm)	Max. height (mm)	Min height (inch)	Max. height (inch)
SM 16 LP-ASTR combined with				
SMTp 16-ASTR10	28	38	1,10	1,50
SM 20 LP-ASTR combined with				
SMTp 20-ASTR10	27	37	1,06	1,46
SMTp 20-ASTR16	34	44	1,34	1,73
SM 24 LP-ASTR combined with				
SMTp 24-ASTR10	28	38	1,10	1,50
SMTp 24-ASTR18	36	46	1,42	1,81
SM 30 LP-ASTR combined with				
SMTp 30-ASTR10	28	38	1,10	1,50
SMTp 30-ASTR18	36	46	1,42	1,81
SMTp 30-ASTR25	43	53	1,69	2,09
SM 36 LP-ASTR combined with				
SMTp 36-ASTR10	38	48	1,50	1,89
SMTp 36-ASTR18	46	56	1,81	2,20
SM 42 LP-ASTR combined with				
SMTp 42-ASTR10	43	53	1,69	2,09
SMTp 42-ASTR18	51	61	2,01	2,40

5.1.3 Additional Bottom Rings

During installation, it is permissible to place an additional bottom ring in order to extend the maximum height of the SKF Vibracon original and low profile chocks.

This ring will be mounted between the base plate of the chock and the top plate of the foundation.



Suitable for Vibracon model	Metric			Imperial			Height (H)
	D over all (mm)	D (mm)	d (mm)	D over all (inch)	D (inch)	d (inch)	
SM 12	66	60	40	2,60	2,36	1,57	To be specified by customer
SM 16	86	80	50	3,39	3,15	1,97	
SM 20	106	100	60	4,18	3,94	2,36	
SM 24	126	120	80	4,96	4,72	3,15	
SM 30	146	140	95	5,75	5,51	3,74	
SM 36	166	160	105	6,54	6,30	4,13	
SM 42	196	190	125	7,72	7,48	4,92	
SM 48	226	220	155	8,90	8,66	6,10	
SM 56	236	230	165	9,30	9,06	6,50	
SM 64	256	250	185	10,08	9,84	7,28	

As a rule of thumb, the height of the chocks should not exceed the diameter of the elements. For instance, the maximum height of an SKF Vibracon SM 30, with a diameter of 140 mm, can go up to a chock height of 140 mm; with the maximum height of the SM 30 of 62 mm this means a maximum height of the Additional Bottom Ring of 78 mm.

5.2 Additional products

5.2.1 Adjustment tools



The SKF Vibracon adjustment tools are especially designed for safe height alteration of the SKF Vibracon chocks.

SKF Vibracon adjustment tool set for SKF Vibracon	
Designation	Set of 2 tools suitable for following sizes (all materials):
SMAT 006	Vibracon SM 12 and SM 16
SMAT 008	Vibracon SM 20 and SM 24
SMAT 010	Vibracon SM 30, SM 36 and SM 42
SMAT 012	Vibracon SM 48, SM 56 and SM 64

SKF Vibracon adjustment tool set for SKF Vibracon Low Profile	
	
Designation	Set of 2 tools suitable for following sizes:
SMAT 006 LP3	SM 16 LP-ASTR SM 20 LP-ASTR
SMAT 008 LP4	SM 24 LP-ASTR SM 30 LP-ASTR SM 36 LP-ASTR SM 42 LP-ASTR

5.2.2 SKF Vibracon protection cover

To protect the thread of the SKF Vibracon against entrance of environmental dirt and fluids there is the option to deliver a protection cover.

This type of covers is produced on request. The outside is made of stainless steel; the inside liner is a foam which will be compressed after installation.

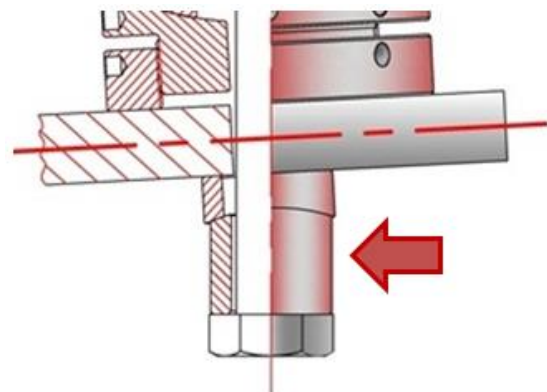
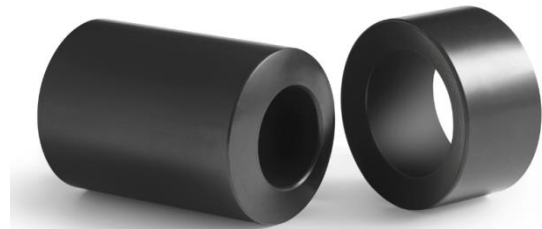
Final design is subjected to project requirements and can differ from examples shown below.



5.3 SKF Spherical Washer

SKF spherical washers are designed to create an exact parallel plane between the bolt head and the face of the nut.

In contrast to DIN spherical washers, SKF Spherical Washers are able to withstand the typical forces generated by tensioning of the bolts, without the need for reduction of tensioning forces.



The main advantages are:

- It automatically adjusts to compensate for angles.
- Bolt tension is evenly distributed.

- Increased bolt stretch possible due to increased clamping length.
- Use of high-grade alloy steel gives lower chance of failure.
- Eliminates bolt bending.
- Reduces bolt fatigue.
- Prevent spot-facing.

5.3.1 Spherical Washer standard height

As a standard the Spherical Washer is being design with 60 mm height which makes an extension sleeve redundant.

Another major advantage of the SKF spherical washer is that it has been engineered to facilitate machining down its own height. Standard SKF spherical washers come in alloy steel (AS). We stock the standard height and low profile version.

SKF Spherical Washer				
	Metric (mm)		Imperial (inch)	
Designation	D	d	D	d
SMSW 16 -ASTR	33	17	1,30	0,67
SMSW 20 -ASTR	42	23	1,65	0,91
SMSW 24 -ASTR	47	27	1,85	1,06
SMSW 27 -ASTR	52	30	2,05	1,18
SMSW 30 -ASTR	56	34	2,20	1,34
SMSW 36 -ASTR	67	40	2,64	1,57
SMSW 42 -ASTR	82	46	3,23	1,81
SMSW 48 -ASTR	92	52	3,62	2,05
SMSW 56 -ASTR	102	59	4,02	2,32
SMSW 64 -ASTR	112	66	4,41	2,60

5.3.2 Spherical Washer Low Profile

In situations where there are constraints in space to use the standard spherical washer, the Spherical Washer Low Profile provides the same advantages but with a shorter height.

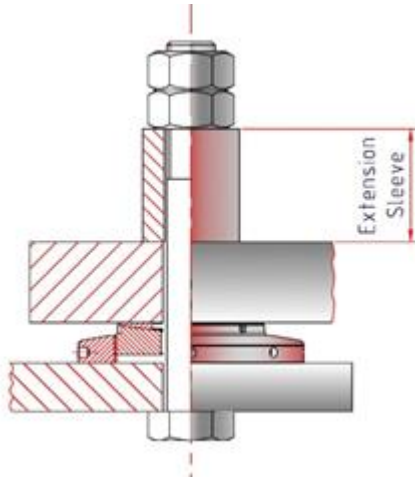
SKF Spherical Washer Low Profile						
	Metric (mm)			Imperial (inch)		
Designation	D	d	H	D	d	H
SMSW 16LPAST	33	17	20	1,30	0,67	0,79
SMSW 20LPAST	42	23	22	1,65	0,91	0,87
SMSW 24LPAST	47	27	24	1,85	1,06	0,94
SMSW 27LPAST	52	30	26	2,05	1,18	1,02
SMSW 30LPAST	56	34	28	2,20	1,34	1,10
SMSW 36LPAST	67	40	30	2,64	1,57	1,18
SMSW 42LPAST	82	46	34	3,23	1,81	1,34

5.3.3 Foundation bolts

SKF advise to use 8.8 graded bolts, yield strength > 630 N/mm², as a minimum requirement in SKF Vibracon applications. Alternative bolt materials can be used after review from our engineering team. For achieving the perfect mounting, we advise to ensure that the foundation bolt has a minimum elongation of **0.20 mm / 0.08 inch**.

5.3.4 Extension sleeves

There are several alternatives to create enough elongation in the foundation bolt. The commonly used measure to create sufficient clamping length is the use of an extension sleeve.



5.3.5 Mounting kit

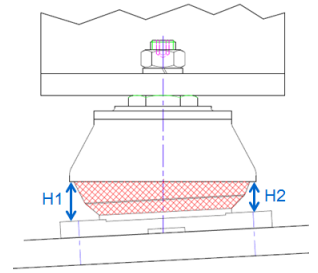
SKF can recommend or even supply a complete mounting kit. This will ensure you have the right materials at hand when starting the installation process. Alternatively, we can recommend the fasteners to use in order to properly and reliably mount your equipment.

5.3.6 Resilient mounting kit

In applications where there is a need to isolate vibrations and noise, resilient mounts, also known as Anti-Vibration mounts, are commonly used. Especially in the marine market there are a limited number of anti-vibration products which do have the marine type approvals and therefore are commonly used.



In order to meet the requirements of properly mounting these resilient mounts the Vibracon mounting kit has been developed. The kit makes it easy to comply with manufacturers' installation requirements and saves time in the chocking process. This solution requires no resin or welding, so chemicals and welding fumes are eliminated.



$H1 - H2 \leq 0.5\text{mm}$

Main benefits are:

- Universal chocking solution
- Quick and easy installation
- Slope & angular compensation
- Height adjustable
- Re-adjustable
- Re-usable
- Clean & environmental friendly
- No special installation skills required
- All in 1 box
- Based on original SKF Vibracon

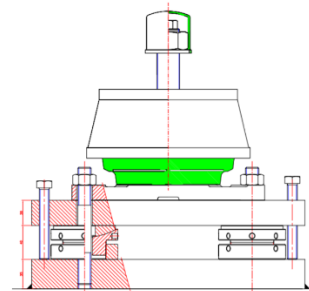
This kit consists of all parts and tools required to install one resilient mount and consists of:

- 1 BP4 Adapter Plate
- 4 SKF Vibracons (Standard or Low Profile)
- 4 locking screws
- 4 SKF Spherical Washers
- 4 foundation bolts with nuts and washers
- 4 jack bolts
- 1 set of tools

SKF Resilient mounting kit (metric dimensions)			
Metric (mm)			
Designation	A	B	H Min - Max
SM BP4 16LPAST	190	140	25 - 35
SM BP4 16CST	190	140	40 - 50
Compatible with Evolo631 / RD314 / RD315 / RD344 / T35/T60			
Designation	A	B	H Min - Max
SM BP4 20LPAST	205	150	25 - 35
SM BP4 20CST	205	150	45 - 55
Compatible with Evolo633 / RD214 / RD215 / RD244 / T50 / T90			

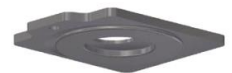
SKF Resilient mounting kit (Imperial dimensions)			
Imperial (inch)			
Designation	A	B	H Min - Max
SM BP4 16LPAST	7,48	5,51	0,98 - 1,38
SM BP4 16CST	7,48	5,51	1,57 - 1,97
Compatible with Evolo631 / RD314 / RD315 / RD344 / T35/T60			
Designation	A	B	H Min - Max
SM BP4 20LPAST	8,07	5,91	0,98 - 1,38
SM BP4 20CST	8,07	5,91	1,77 - 2,17
Compatible with Evolo633 / RD214 / RD215 / RD244 / T50 / T90			

Larger sizes or other dimensions are available on request.



5.3.7 SKF Spherical Shim

SKF Spherical Shims have been designed to overcome angular soft foot problems during mounting. Matching the dimensions of precut steel shims the Spherical Shim has been designed to optimize the contact surface between the foundations top plate and the machines bed plate.



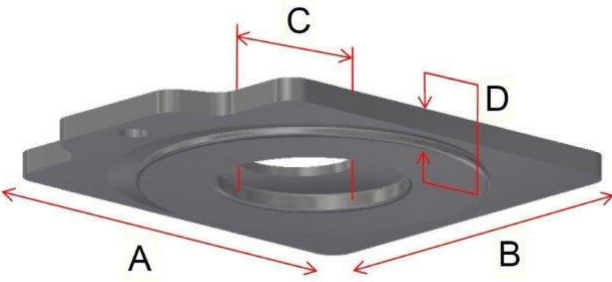
Soft foot is one of the most prevalent conditions found in rotating equipment. Soft Foot is a condition whereby the mounting feet of a machine; pump, motor, compressor, turbine or other rotating equipment, are not in the same plane and are not in proper contact with their mounting positions on the baseplate. It may be either an angular or parallel soft foot, but often it is a combination of the two.

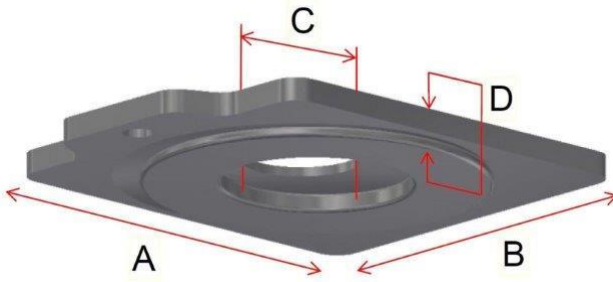
This SKF Spherical Shim effectively compensate for angular misalignment of up to two degrees between the mounting foundation and bottom of the machine foot. This ultimately eliminates Soft Foot and allows for optimal and economical mounting without requiring expensive machining of skid bases and milled blocks, unsafe shim cutting or undesirable step-shimming, or the extra labor and curing time associated with epoxy resin chocks.

The SKF Spherical Shim can be used in combination with traditional shims. By adding traditional shims on top of the SKF Spherical Shim, which should be placed with the spherical plate on the bottom, the required height can be achieved.

The unique design of the SKF Spherical Shim integrates a spherical plate, accommodating for the angular differences inherent with mounting surfaces and maximizing the contact surface between the foundation, spherical shim, and machine foot.

These features allow for quick and easy installation with minimal down-time, while avoiding serious machine distortion caused by Soft Foot.

SKF Spherical Shim (Metric dimensions)				
				
Designation	Metric (mm)			
Rectangular shims	A	B	C	D
SM SPS-A1	55	50	15	3,9
SM SPS-B1	75	70	23	5,3
SM SPS-C1	90	80	32	5,5
SM SPS-D1	125	105	44	7,0
Square shims				
SM SPS-A2	50	50	15	3,9
SM SPS-B2	75	75	23	5,5
SM SPS-C2	100	100	32	7,0
SM SPS-D2	125	125	44	7,5

SKF Spherical Shim (Imperial dimensions)				
				
Designation	Imperial (inch)			
Rectangular shims	A	B	C	D
SM SPS-A1	2,17	1,97	0,59	0,15
SM SPS-B1	2,95	2,76	0,91	0,21
SM SPS-C1	3,54	3,15	1,26	0,22
SM SPS-D1	4,92	4,13	1,73	0,28
Square shims				
SM SPS-A2	2	2	0,59	0,15
SM SPS-B2	3	3	0,91	0,22
SM SPS-C2	4	4	1,26	0,28
SM SPS-D2	5	5	1,73	0,3



6. Technical Support

6.1.1 SKF Vibracon Checklist

To determine the correct Vibracon chock for an application, SKF provides the SKF Vibracon Chocking Proposal as a complimentary service. Based on the characteristics of the to be chocked component as well as auxiliary machinery, SKF can provide a recommendation on Vibracon model and material as well as the fastener sets to be used.

In order to register the proper information, the following details are a minimum requirement.

- End-user and project reference
- Component details
 - o Make, type and model
 - o Mass
 - o Installed power
 - o Revolutions / speed
 - o Number of bolt positions
 - o Bolt hole diameter in foot

This information can be submitted with help of the SKF Vibracon element selection sheet below or by sending in general arrangement drawings to the Vibracon engineering team via vibracon@skf.com.

SKF Maintenance Products
 Website: www.vibracon.com
 E-mail: vibracon@skf.com

SKF Vibracon element selection sheet
 Coloured cells to be filled out

Address information

Company: _____
 Contact: _____
 Phone: _____
 E-mail: _____
 Preference (metric / Imperial): _____
 Customer name: _____
 Project name: _____
 Class / Approval type: _____
 Object: _____
 Make / type / model: _____

Object overall information

Mass: _____ (kg)
 Power: _____ (kW)
 Revolutions: _____ (rpm)
 Number of foundation bolts: _____ (-)
 Foundation bolt-hole diameter: _____ (mm)
 Number of fitted bolts: _____ (-)
 Fitted bolt-hole diameter: _____ (mm)

Additional info for gearbox applications:

Reduction rate: _____ (-)
 Average distance between bolt holes: _____ (mm)
 Height shaft center line - Top plate of foundation: _____ (mm)
 Propulsion efficiency: _____ (N/kW)

Cross section of mounting detail

SKF recommends the use of a spherical washer in the bolt connection at position L:
 - to compensate for angular errors;
 - to increase the clamping length;
 - eliminates bolt bending;
 - to avoid spot facing.

SKF spherical Washer: _____ (yes/no)
 Bolt tightening from top: _____ (yes/no)

Top view of object

A Total length of component base: _____ (mm)
 B Location first hole (seen from flexible coupling): _____ (mm)
 C Pitch between other holes (on one side): _____ (mm)
 D Total width of component base: _____ (mm)
 E Pitch of bolt-holes (left to right): _____ (mm)
 F Foundation width (inside): _____ (mm)
 M Foot length: _____ (mm)

G Top sleeve length foundation bolt: _____ (mm)
 H Bed plate thickness: _____ (mm)
 J Chock height: _____ (mm)
 K Top plate thickness: _____ (mm)
 L Bottom sleeve length foundation bolt: _____ (mm)
 Bottom sleeve length fitted bolt: _____ (mm)

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This checklist can also be found in Appendix 1.

6.1.2 SKF Vibracon Chocking Proposal

Upon receipt of component information, the SKF Vibracon engineering team will provide a chocking proposal. This chocking proposal consist of a Vibracon selection, bolt and tightening torque recommendations which, if required, can be shared with OEM and other advisory bodies.

An example of the chocking proposal can be found below.

SKF Maintenance Products
 Nieuwegein - The Netherlands
 Website: www.vibracon.com
 E-mail: vibracon@skf.com

Customer name: _____
 Project name: _____
 Classification society: _____
 Object: _____
 Make / type / model: _____

Selection of Vibracon SM element

Machine

Mass: _____ (kg)
 Power: _____ (kW)
 Revolutions: _____ (rpm)
 Foundation width (bolt distance): _____ (mm)
 Number of elements: _____ (-)
 Bolt-hole diameter: _____ (mm)

Correction / Safety factor: _____ (-)
 Minimum required Vibracon SM element: _____ (-)

Advised Vibracon SM element

Element load (maximum): _____ (kN)
 Element load (minimum): _____ (kN)
 Machine load: _____ (kN)

Calculation of holding down bolts' torque

Foundation bolt

Foundation bolts: _____ (-)
 Material: _____ (-)
 E-modul: _____ (N/mm²)
 Yield stress: _____ (N/mm²)

Elongation foundation bolt: _____ (mm)
 Tension per bolt: _____ (kN)
 Tensile stress: _____ (N/mm²)
 Utilized yield stress: _____ (%)
 Von Mises stress (tensile / torsion): _____ (N/mm²)
 Utilized yield stress < 90 %: _____ (%)

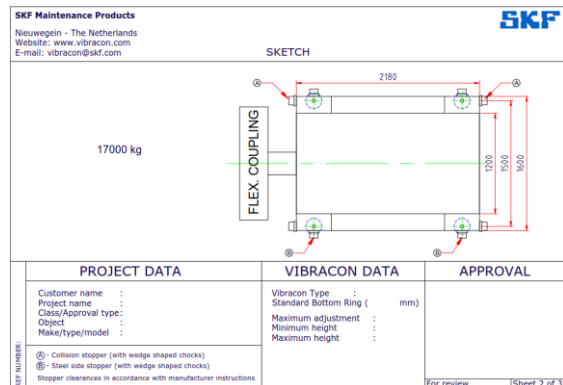
Tightening torque: _____ (Nm)

For review

REF. NUMBER: _____

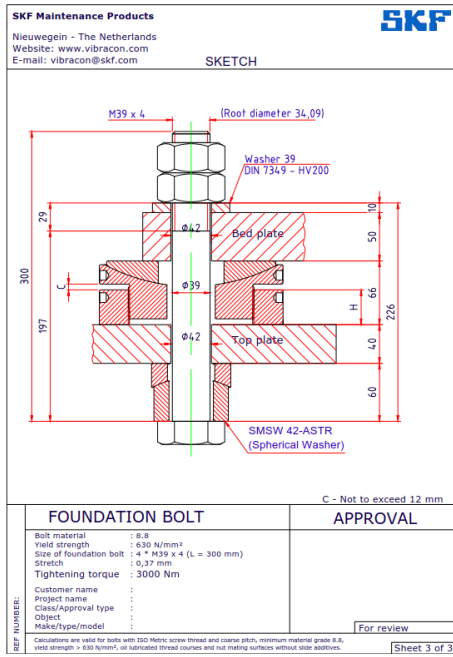
Sheet 1 of 3

Component data, SKF Vibracon chock size selection and calculation of the elongation and tightening torque of the foundation bolt.



Top view of the component with the location of the SKF Vibracon chocks

SKF Vibracon chock Application and Installation Guide

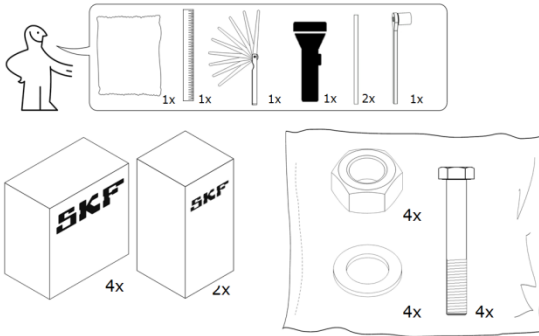


Cross section of the bolted connection which can be used for instruction of the engineer to install.



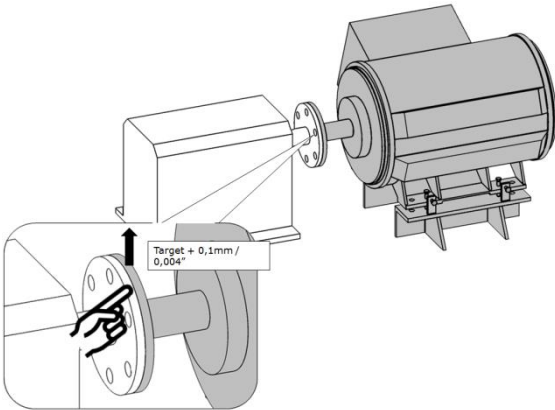
7. Installation instructions

1.



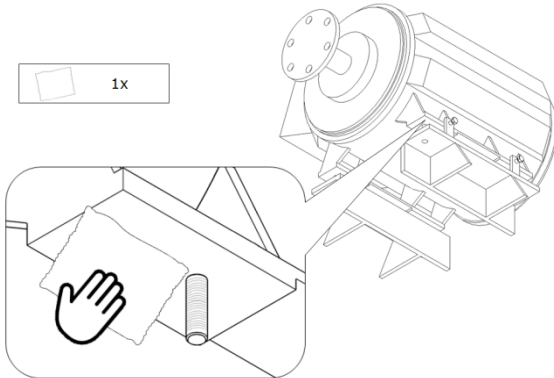
- Required tools and materials
- Materials in the plastic bag are non-standard SKF products
- Keep boxes closed till further notice

2.



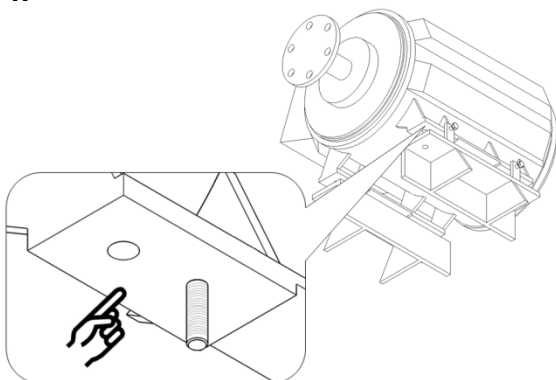
- For compensation of compression of the total package during tightening of the foundation bolt it is advised to position the component 0,1 mm (0.004 inch) above target.

3.

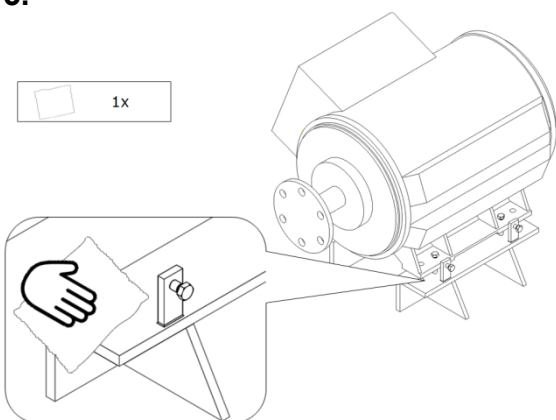


- Clean the lower side of the base plate (foot) of the component with a cloth.

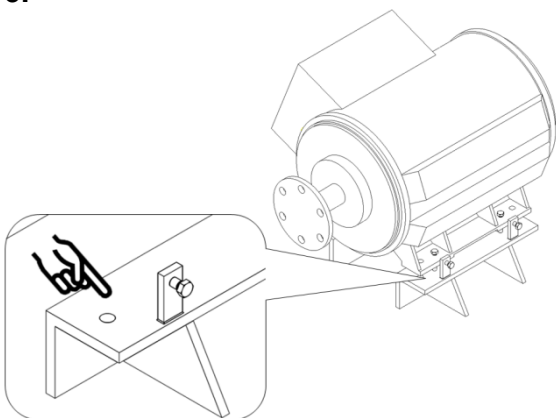
4.



5.



6.

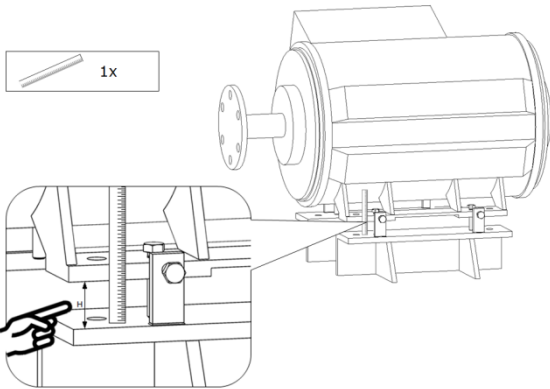


- Visual inspection of the lower side of the base plate.
- Surface should be free from damages, dirt and rust.
- Paint is not recommended and can have a negative impact on the clamping force of the foundation bolt.

- Clean the top side of the top plate of the support construction with a cloth.

- Visual inspection of the top plate.
- Surface should be free from damages, dirt and rust.
- Paint is not recommended and can have a negative impact on the clamping force of the foundation bolt.

7.

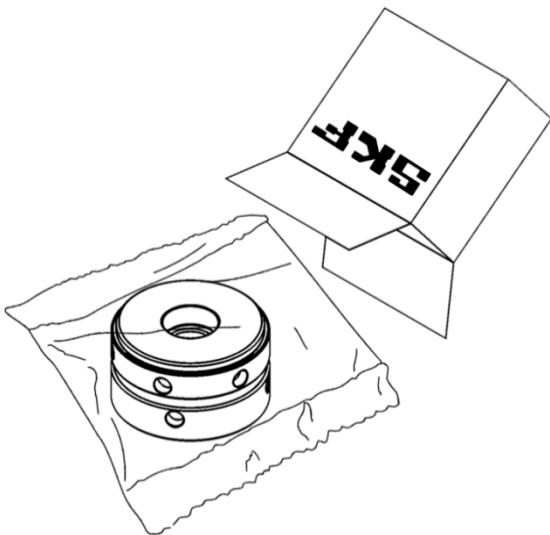


8.

- Measure the actual available chocking height at each mounting position.

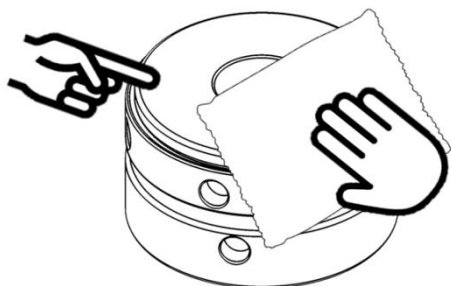
- Compare the actual measured height with the Maximum element height that is engraved on the outside of the Vibracons bottom ring or printed on the box.
- Actual height should be within the maximum element height range of the delivered SKF Vibracon!

9.



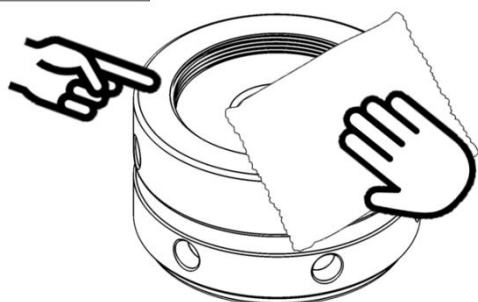
- After the mentioned check the box can be opened.
- The product is packaged in a corrosion protective plastic bag.

10.



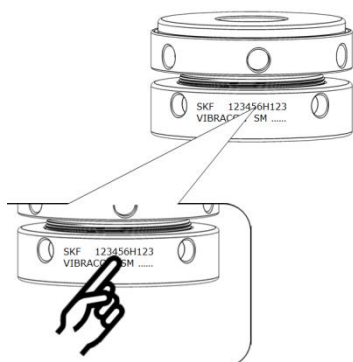
- Clean the top of the product with a clean cloth.

11.



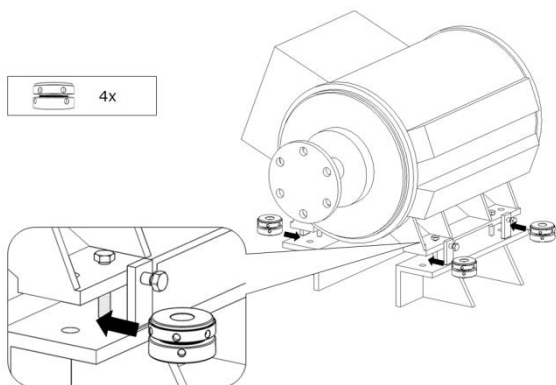
- Clean the bottom of the product with a clean cloth.

12.



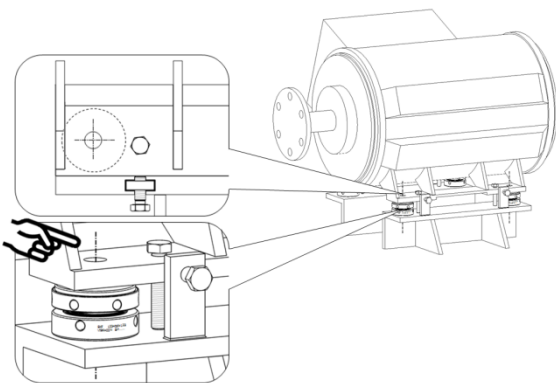
- Product is marked with a batch number for traceability purposes.
- Check the batch number located at the outer circumference of bottom ring.
- Write down this number in case material certificates are required.
- Request the related certificates through vibracon@skf.com.

13.



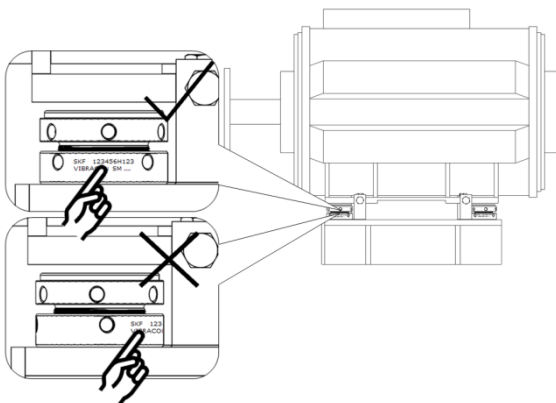
- Slide in the product from the side at all the foundation bolt hole positions.

14.



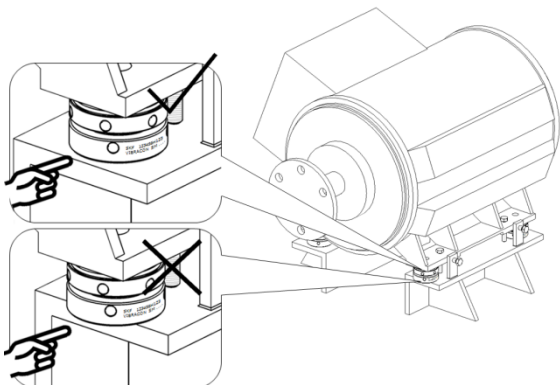
- Center the position of the product concentric with the bolt hole

15.



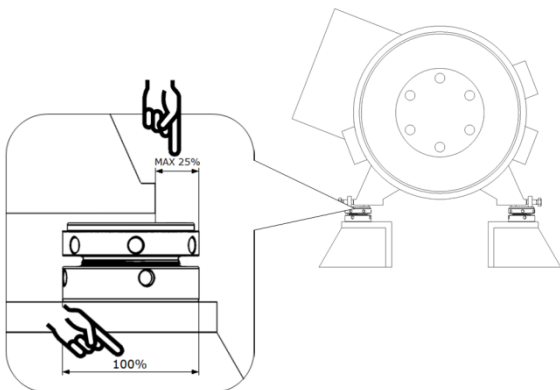
- Install the product in a position that it is easy to read the batch number.
- Location of the batch number faced to the outside of the installation is preferred.

16.



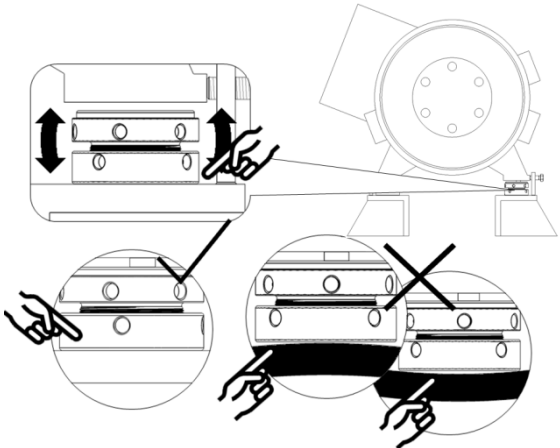
- The bottom ring of the product should be completely, 100%, supported by the support construction.

17.



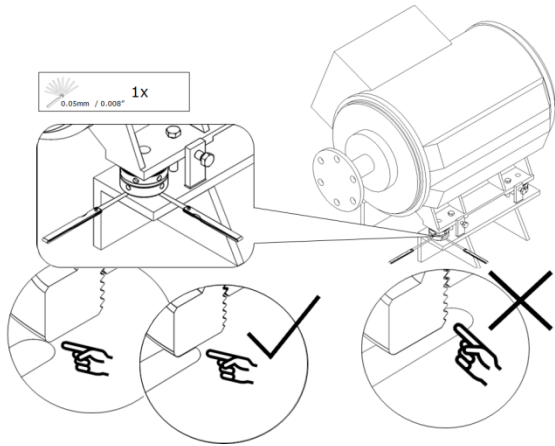
- The top plate of the product should be covered by the component foot by at least 75%

18.



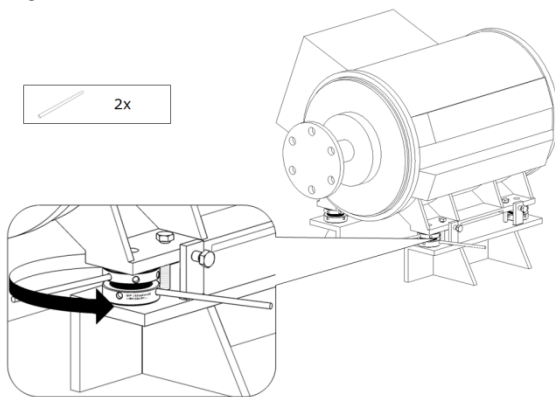
- Execute a so called wobbling / rocker test to check the quality of the contact surface between product and support construction.

19.



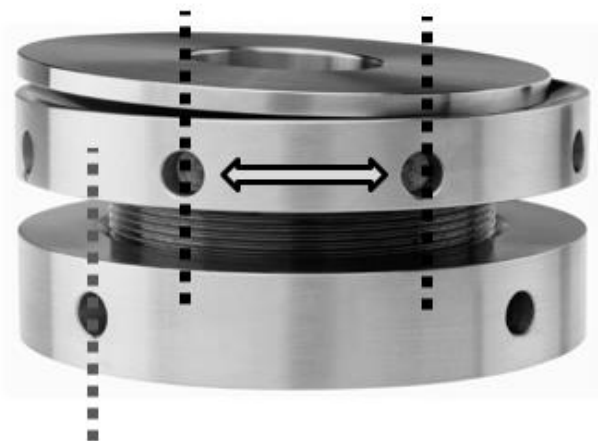
- Check the flatness / contact area by the use of a feeler gauge of 0,05 mm (0.002 inch).

20.



- Adjust the center ring by using two rods or a pin wrench which fit in the circular holes in the outer circumference of the center ring and the bottom ring.
- Use the same tightening force at each position.

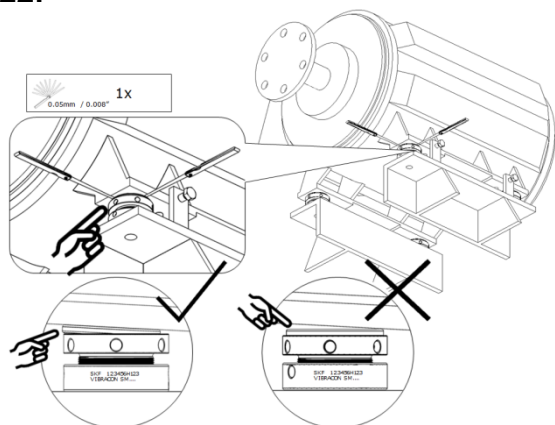
21.



SKF Vibracon vertical adjustment

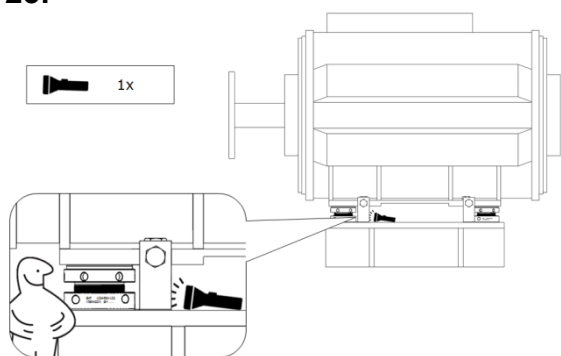
Vibracon type	Number of adjustment holes	Thread Pitch [mm]	Height adjustment	
			1 hole [mm]	1/2 hole [mm]
SM 12	6	1	0,167	0,083
SM 16	8	1,5	0,188	0,094
SM 20	8	2	0,250	0,125
SM 24	8	2	0,250	0,125
SM 30	8	2	0,250	0,125
SM 36	8	2	0,250	0,125
SM 42	8	2	0,250	0,125
SM 48	8	3	0,375	0,188
SM 56	10	3	0,300	0,150
SM 64	10	3	0,300	0,150
SM 80	12	4	0,333	0,167

22.



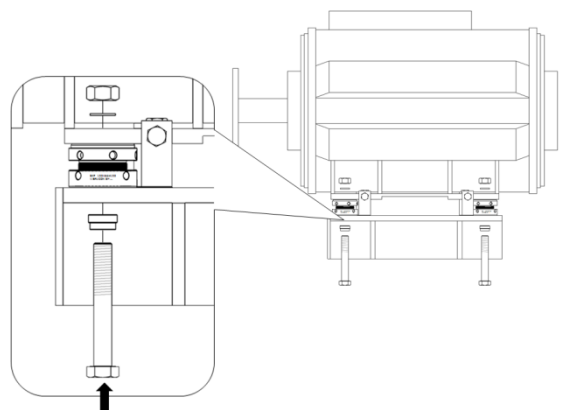
- Check positioning of the top plate compared to the lower side of the component surface. Top plate has to swivel in the right angle.

23.



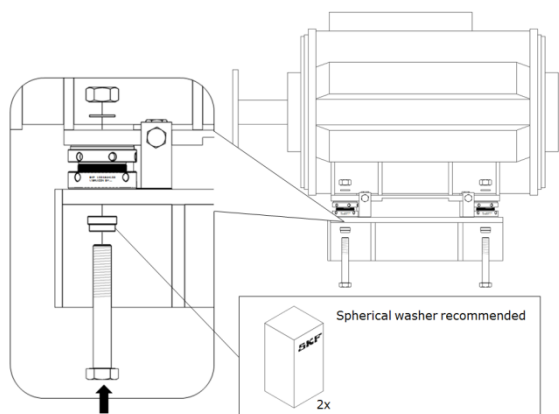
- From field experience we advise to make use of a flashlight for an easy check of the contact between the Vibracon chock and the component.

24.



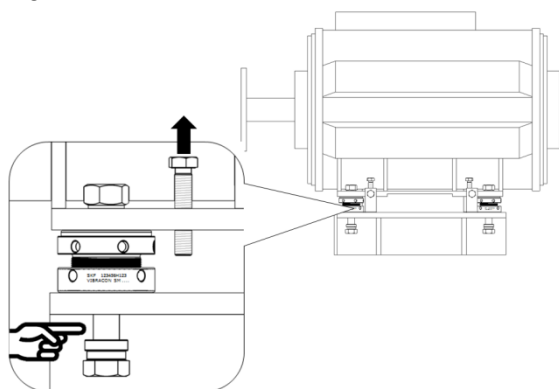
- Install the foundation bolt, preferably from bottom up.

25.



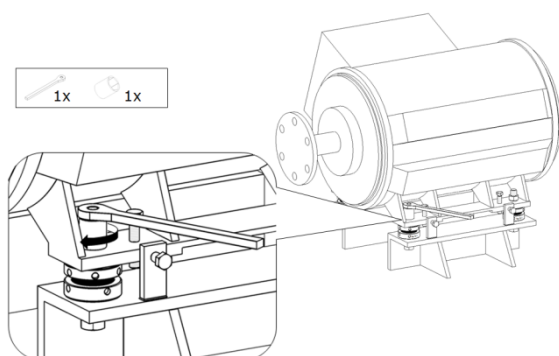
- To avoid bending forces on the bolt which have an influence on the fatigue of the bolt, SKF recommends the use of the SKF Spherical Washer to create a plan parallel mating surface under the hexagonal bolt head and the hexagonal nut.

26.



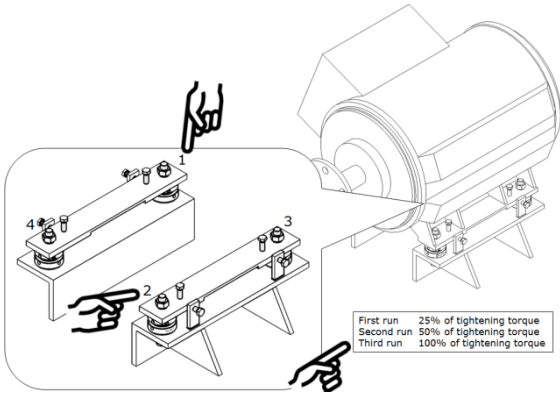
- Release the adjustment bolts, the complete weight of the component is now transferred to the SKF Vibracon.
- The foundation bolts not to be tightened before releasing the adjustment bolts!

27.



- Tighten the foundation bolts in the sequence and number of runs recommended by the Original Equipment Manufacturer (OEM).

28.

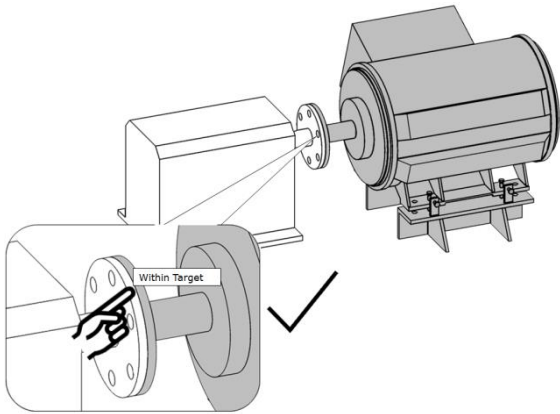


- In case the number of runs is not given by the OEM SKF advise to tighten the bolts in a minimum of 3 runs:

First run	: 25%
Second run	: 50%
Third run	: 100%

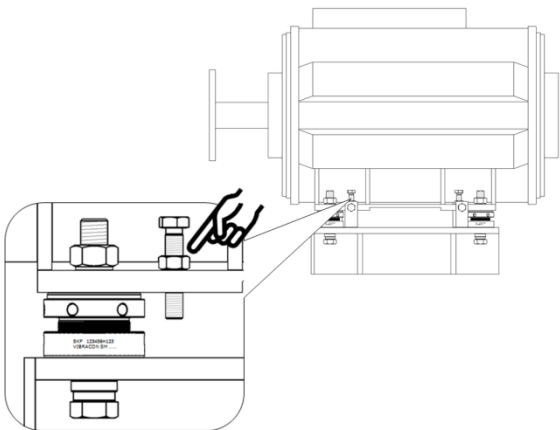
- Note : The number of runs have an influence on the accuracy of the final pretension in the foundation bolt

29.



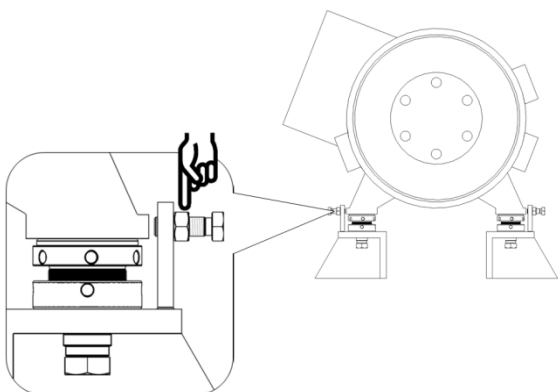
- Check if the alignment of the component is within the tolerance of the final alignment target.
- In case the alignment is out of tolerance, than foundation bolts have to be loosened and alignment needs to be done again starting from number 13.

30.



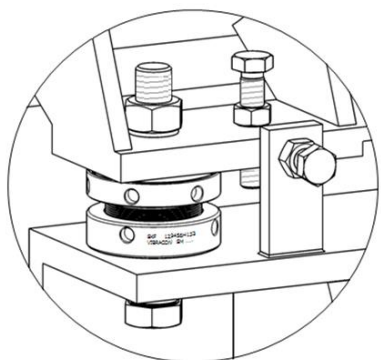
- After the alignment check the vertical adjustment bolts can be locked with a hexagonal nut.
- It is advised to keep the adjustment bolts together with the component for use in future.

31.



- After the alignment check the horizontal adjustment bolts can be locked with a hexagonal nut.
- It is advised to keep the adjustment bolts together with the component for use in future.

32.



- You are done; the component has been successfully mounted on SKF Vibracon chocks.

8. Marketing and publications

8.1 Available brochures and datasheets

SKF Vibracon datasheet
 PUB MP/P8 17660 4 EN – November 2017



SKF Spherical Washer datasheet
 PUB MP/P8 17736 EN – January 2018



SKF Vibracon - Quick start guide
 PUB 43/P2 16115/1 EN – May 2016



SKF Spherical Shim

PUB 43/P2 16699 EN – May 2016

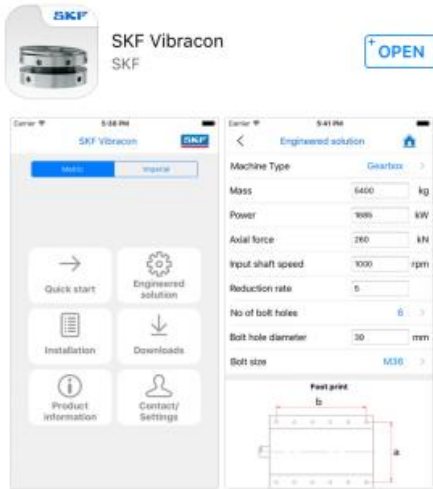


SKF Vibracon kit for resilient mounts
 PUB 43/P2 16778 EN – August 2016



8.2 Vibracon Selection App

The SKF Vibracon calculation app is an easy tool to quickly calculate the suitable SKF Vibracon.



Available on

- iOS App Store
- Google Play Store
- Baidu App Store

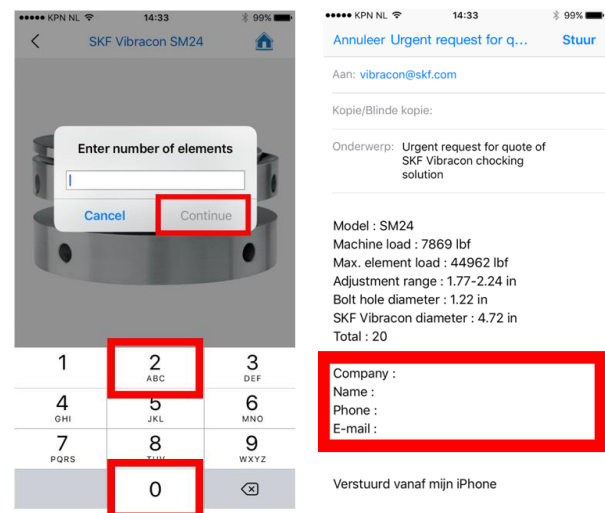
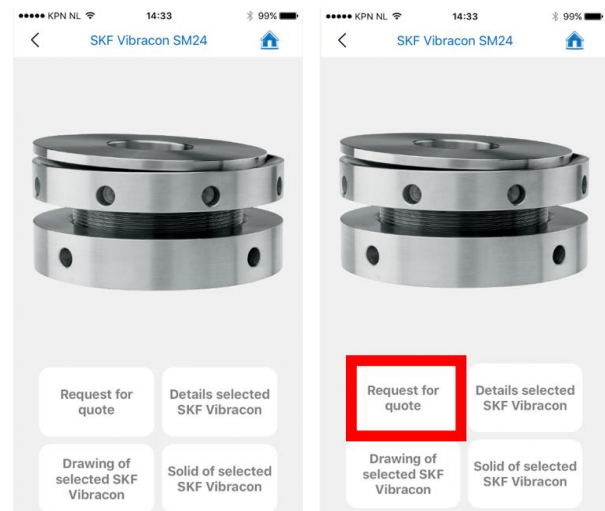
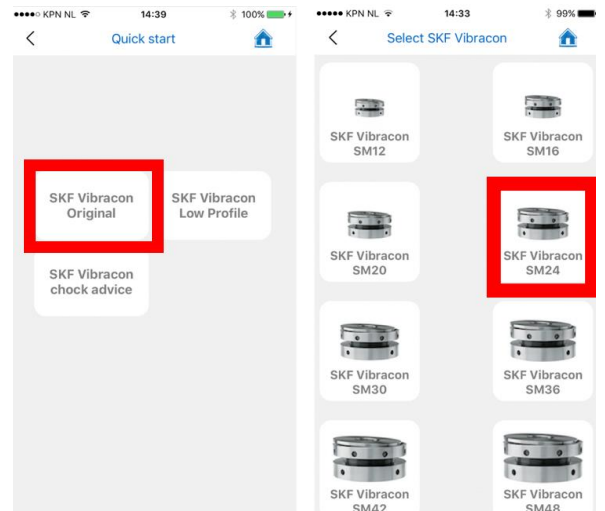
Main features

1. Quickstart modus
 - Products details and downloads of product drawings
 - Checklist for obtaining a chocking proposal
2. Calculation module based on following parameters:
 - Machine Type
 - Mass
 - Power
 - Speed
 - Number of bolt positions
 - Bolt hole diameter
 - Bolt size
 - Transversal bolt pitch
 - Available chocking height
3. Installation guide
4. Download section for brochures and movies
5. Product information with application guide
6. Contact / Settings

For some frequently used functions we will go in more detail below.

Request for quote.

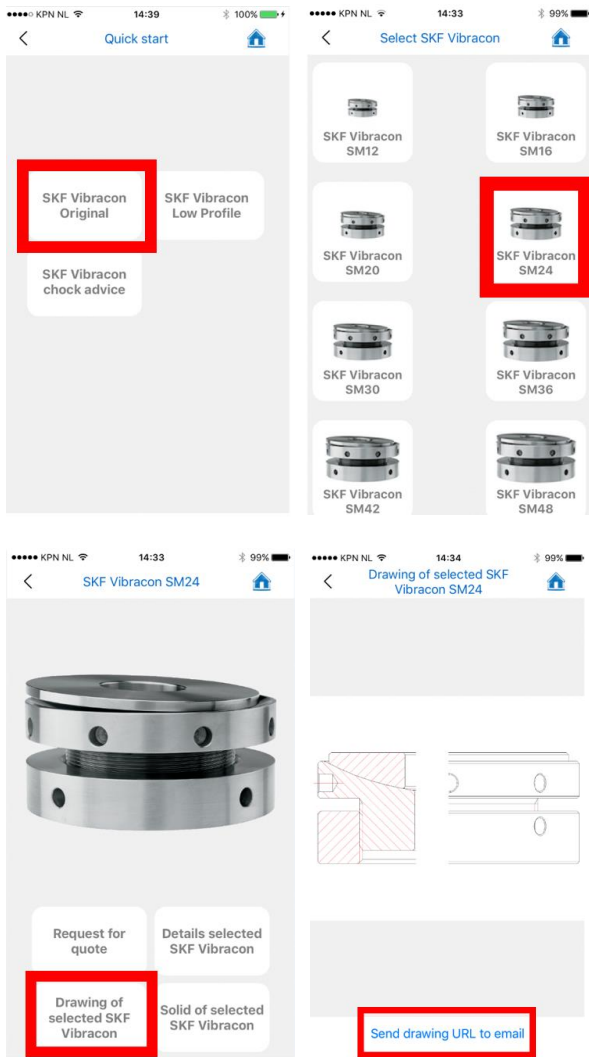
When this function is used and your contact details are filled in we will contact you soon with an offer.



Download drawings

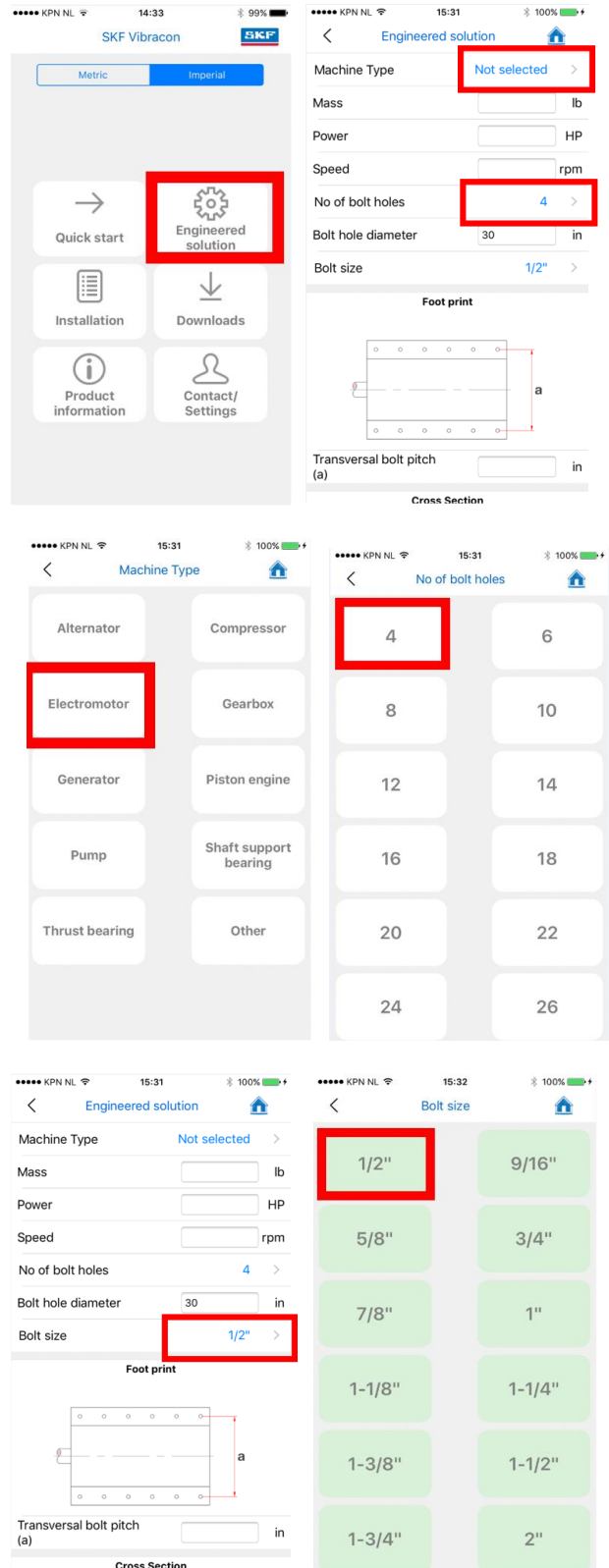
Download SKF Vibracon drawings in .dwg or /igs format for own use.

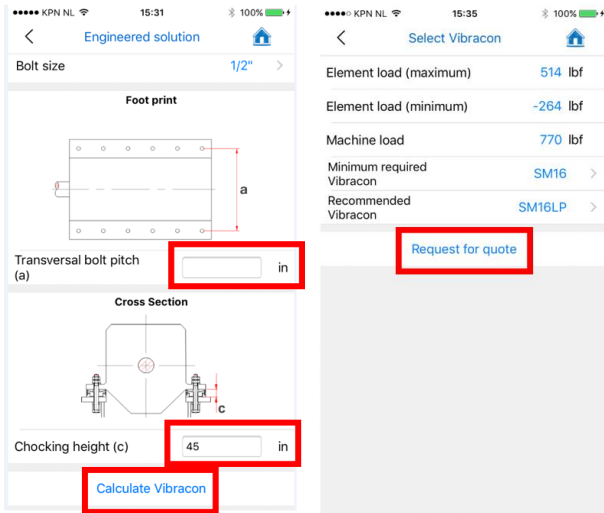
SKF Vibracon chock Application and Installation Guide



Perform your own Vibracon calculation.

In the below example imperial function is used. Both imperial and metric function is available and can be selected in the main menu. With the request for quote function at the end of the calculation it is easy to contact SKF to obtain a quotation for the selected Vibracon models.





- The SKF Vibracon demo rig is a compact and portable SKF Vibracon demonstration kit. It is ideal for fairs and distributors and a perfect gift for our customers.

8.2.1 Samples and demonstration tools

With the SKF Vibracon give-aways and demonstration tools it is easy to demonstrate the use and present the added value of the SKF Vibracon solutions.





The following products are available for this purpose.

- Give-aways are available as surface treated and stainless steel models. The samples are scaled down Vibracons and are a sought-after product for engineers, influencers and decision makers.



- The SKF Vibracon demo case shows the benefits and capabilities of the SKF Vibracon portfolio, including Spherical Washers and is ideal for showrooms, fairs, trainings and customer visits. On the pendrive all relevant Vibracon information can be found.



Samples and demonstration tool designations	
Designation	
SM 10 -CSTR	
SM 10 -SS	
SM C1 DEMO	
SM C2 DEMO	

9. Frequently Asked Questions

9.1 General

9.1.1 What is an SKF Vibracon chock?

The SKF Vibracon chock is a universal adjustable steel chock. Universal refers to the fact that a SKF Vibracon chock can be used instead of rigid steel chocks, shims or epoxy resin chocks.

Adjustable refers to the possibility of aligning and re-adjusting the chock at every re-alignment event. The name of the chock "Vibracon" suggests that the elements can absorb vibrations like a vibration damper. We want to point out that the SKF Vibracon chock is absolutely **not** a vibration damper (resilient mount).

9.1.2 How long have SKF Vibracon chocks been in use?

The SKF Vibracon chocks were designed and patented by the company Machine Support, which became SKF Marine Industry Service Centre in 2011. In 1988 the Vibracon Original was designed and in 2003 the Vibracon Low Profile was added to the line of products of SKF. In 2017 the SKF Vibracon was recognized as not only a marine product and added to the portfolio of SKF Maintenance Products.

9.1.3 How is the vibracon supported for marine applications?

The SKF Vibracon Original and SKF Vibracon Low Profile chocks are approved by all major shipbuilding classification societies and used by a large number of original equipment manufacturers.

In addition, SKF prepares the mounting proposals which can immediately be used to obtain a plan approval from the class society of choice.

9.1.4 What are the benefits of SKF Vibracon chocks?

In packaged units (like generator, compressor, turbine and pump sets) the benefits are:

- No parallel or angular soft foot problems, even when the skid is twisted;
- No machining of the base frame;
- No on site problems to arrange or install shims;
- Re-adjustable;

- In combination with laser alignment equipment, alignment time can be reduced by 50%;
- Existing chocking systems, steel chocks or epoxy resin with a height of only 20 mm, can be replaced by the SKF Vibracon Low Profile configuration (depending on SKF Vibracon size).

Onboard ships for chocking propulsion units and auxiliary equipment:

- No curing time like epoxy resin chocks;
- No time consuming fitting of rigid steel chocks;
- Chocking can be carried out when the ship is still in the dry dock, the alignment check and (if required) realignment has to be carried out after the ship has been launched;
- No parallel or angular soft foot problems, even if the foundation is not machined;
- No machining of foundation, only locally (where the elements will be fitted) machining if required.

9.1.5 What is more cost effective: SKF Vibracon, Steel chocks, Epoxy Resin or Shims?

In most of the applications the SKF Vibracon chocks will be cheaper because of:

- Reduced installation and chocking time
- Always a perfect fitted chock
- No soft foot problems
- Installation of the SKF Vibracon chocks doesn't require special skills or tools
- Usually no machining of foundations or base frames is required

9.1.6 Where can we use the chocks?

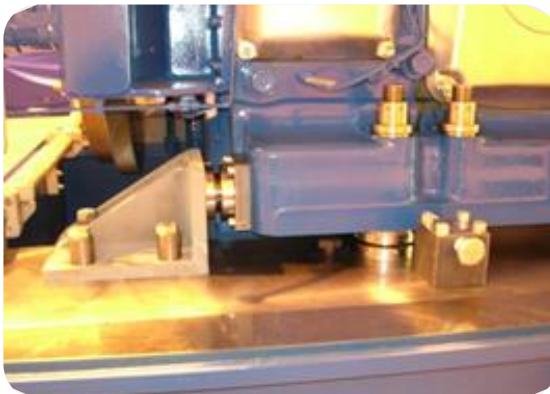


SKF Vibracons are being used in a wide variety of applications and industries. The common denominator is that most applications are rotating

machinery where alignment is critical and downtime is costly.



Generator of generator set mounted on SKF Vibracon chocks.



Detail of bracket with SKF Vibracon chock to create a fixed point (alternative for fitted bolts or stoppers).



Overview of engine mounted on SKF Vibracon chocks on a concrete foundation.

In **production plants** the elements can be used under all kinds of rotating equipment, and also in production lines which need accurate alignment.

When SKF Vibracon chocks will be mounted on a concrete foundation, the maximum allowable surface pressure of the existing concrete has to be checked. In case the surface pressure will be too high, it is possible to reduce the surface pressure, with the use of an additional steel plate of sufficient surface and thickness, to an acceptable level.

9.1.7 Do we need special skills or tools to use the Vibracon chocks?

Special skills or tools are not required to use SKF Vibracon chocks. SKF Maintenance Products always advises you to contact your local dealer for support during the first time installation of the elements. Also, check the installation procedure (Chapter 7 Installation instructions). The use of laser alignment equipment is recommended but not necessary.

9.1.8 How do we order Vibracon chocks?

SKF Vibracon chocks are always on stock at SKF warehouses. However, it is recommended to check the delivery time before ordering. Our local dealers may also have Vibracon products on stock.

9.1.9 Is the SKF Vibracon chock approved by classification societies?

Yes, the chock is approved by all major shipbuilding classification societies. However, it is always necessary to submit a calculation and a sketch of the chocking arrangement for approval for each application. This is mainly necessary for propulsion units and for some societies, also for auxiliary equipment. Contact your local dealer or SKF Maintenance Products for assistance.

The SKF Vibracon is type approved by the following class societies:

- ABS
- Bureau Veritas
- CCS
- DNV - GL
- Lloyds Register of Shipping
- Rina

9.1.10 Are there other relevant certificates that are of use?

- Material Certificates

SKF Vibracon chock Application and Installation Guide

All our Vibracon products are supported with Material Certificates. When the batch number engraved on the bottom ring is submitted to vibracon@skf.com, you will receive the material certificates by return email.

- ISO 9001 Quality Management System
In case a copy of the ISO 9001 certificate is required please email vibracon@skf.com.

- Certificate of Origin or Certificate of Conformity

In case a “certificate of origin” or “Certificate of Conformity” is required you can send an email with the necessary information (name exporter, delivery details, reference numbers, products, size & weight) to your local SKF contact person or to vibracon@skf.com.

- Eur. 1
In case a “Eur. 1” certificate is required you can send an email with the necessary information (name exporter, delivery details, reference numbers, products, size & weight) to vibracon@skf.com.

- Long Term Supplier Declaration
In case a “Long Term Supplier Declaration” is required you can send the proposed document to your SKF contact person or to vibracon@skf.com.

LONG-TERM SUPPLIER'S DECLARATION FOR PRODUCTS HAVING PREFERENTIAL ORIGIN STATUS¹

DECLARATION

I, the undersigned, declare that the goods described below:
Steelshims in various sizes

which are regularly supplied to SevenSeas, originate in the European Union and satisfy the rules of origin governing preferential trade with:

- AD / CH / TR /
- AL / BA / XK (= KO) / ME / MK / XS (= RS) /
- CL / MX /
- DZ / EG / FO / IL / JO / LB / MA / PS / SY / TN / XC / XL /
- SE / MD / UA /
- RS /
- ZA /
- Andes (CO / PE)
- Caribbean (AG / BB / BS / BZ / DM / DO / GD / GY / JM / KN / LC / SR / TT / VC /)
- EEA (IS / LI / NO /)
- ESA (MG / MU / SC / ZW /)
- Central America (CR /
- GSP (= LDC and OBC) / OCT / MAR. ACP
- Central America / CR / GT / HN / NI / PA / SV /)
- West Pacific (PG / FJ /)

I declare that:
 Cumulation applied with (name of the country/countries)
 No cumulation applied

This declaration is valid for all shipments of these products dispatched from: 01-01-2016 to 31-12-2016.

I undertake to inform SevenSeas immediately if this declaration is no longer valid.

I undertake to make available to the customs authorities any further supporting documents they require.

Place and date : Ridderkerk, 05-10-2016

Name and position : Daniël Kessels, Supply Chain Coordinator Marine

Name and address of the company : SKF Solution Factory – Marine Services
Nikkelstraat 7, 2984 AM Ridderkerk, the Netherlands

Signature :

¹ Declarations according to Regulation (EC) 2015/2447 art. 62, Annex 22-16 (PB L 343 of 29.12.2015)

- Asbestos Free Declaration
In case a “Asbestos Free Declaration” is required, please send the concerned document to vibracon@skf.com.

General Asbestos Free Declaration

Company name:	SKF Solution Factory Marine Services
Address:	Nikkelstraat 7
Postal code:	2984AM
City:	Ridderkerk
Country:	The Netherlands
Telephone number:	+31 (0)104483529
Name of authorized representative:	P. Vermunt
Function of authorized representative:	Product Manager

Herewith, we declare that the products, goods and materials that we deliver to ... for ship building and use on ships, do not contain any kind of asbestos and are in accordance with SOLAS II-1, A1, regulation 3-5 and IACS Unified Interpretation UR SC 249 as IMO MSC.1/Circ.1379 and IMO MSC.1/Circ.1425.

Place: Ridderkerk Company stamp:

Date: 1 September 2016

Signature:

- Dual-use
Standard SKF Vibracons are not concerned by CDR 1382/2014 / 428/2009 and therefore not classified as “Dual Use”.

9.1.11 How to handle non-standard product orders/enquiries?

Engineering enquiries with a scope outside our standard range can be sent to vibracon@skf.com. Our Vibracon engineers will revert with a proposal and product recommendation. In addition, they will make sure the correct product will be made available.

9.1.12 I or my contact person at SKF cannot find the right product in COH / Prodmast?

Please note that the syntax of the SKF Vibracon designations is critical and if miswritten will not return the correct results.

9.1.13 What is the delivery time?

The majority of the SKF Vibracon products are kept on stock in large quantities enabling short delivery times. Please contact your local SKF contact person for support on lead times and stock levels.

9.2 Technical questions

9.2.1 What is the difference between machine load, element load, proof load and failure load?

Machine load

The machine load is the sum of the weight of the component + the dynamic forces operating on the SKF Vibracon. The total weight of the component to be divided by the number of SKF Vibracon Chocks under the component and the dynamic forces are calculated for the heaviest loaded position. These forces multiplied with a safety factor gives us the "Machine Load" which is the base for the Vibracon chock size selection.

Maximum element load

The maximum element load allowed (at the maximum height) on the SKF Vibracon chock during normal operation of the equipment, including the weight of the machine, operational loads and bolt force. The maximum element load includes a safety factor in order to accommodate additional forces during malfunction operation (Maximum element load > Machine Load + Bolt load).

Proof load

Proof load is the tested load which can be applied on the SKF Vibracon chock at the maximum height

before plastic deformation will occur. Exceeding the proof load will permanently deform the chock, rendering it no longer adjustable.

9.2.2 Is it possible to chock a heavy component on an SKF Vibracon chock?

Yes, the primary forces for this Vibracon sizing consideration are:

F_{weight} due to gravity

F_{torque} due to the fact that the machine wants to rotate

F_{bolt} due to the tightening torque of the foundation bolt

F_{bolt} is approximately 6 till 10 times F_{weight} and even 10 till 15 times F_{torque} .

This means that F_{bolt} is the critical force on the normal element. If we consider, for example, the SKF Vibracon SM 30 chock, we can see that we are tightening a M30 bolt against a M95 thread (internal thread size of an SKF Vibracon SM30). It is easy to understand that the SKF Vibracon chock can't be damaged by the machine forces unless the element sizes are wrongly calculated or the foundation bolts are insufficiently tightened.

9.2.3 Can we align a machine with an SKF Vibracon chock?

The SKF Vibracon chocks are primarily meant for chocking! For aligning the machine, hydraulic tools or jack bolts are recommended. When the weight of the machine is compressing the element it will lock itself automatically due to friction in the thread.

9.2.4 Do I need to tack weld the SKF Vibracon chock to the top plate when installing?

There is no need to tack weld any part of the SKF Vibracon chock.

Remark:

Avoid welding in the direct circumference of rotating equipment. If welding is required take care for proper earthing!

9.2.5 How do we prevent the chock from rotating?

The SKF Vibracon chock will lock itself due to friction in the thread after the foundation bolts are tightened. It is not necessary to lock the chock in any other way.

9.2.6 Are there any limits to the chock height?

Yes, there are limits to the standard chocks. Please check in the table on the SKF Vibracon brochure the minimum and maximum height of each type of chock. When designing a chocking arrangement, we recommend to consider the nominal height of the chock.

9.2.7 What to do if we want to have chocks with extended height?

In this case, it is possible to use an extended Vibracon model or an additional bottom ring. The maximum height of the chock should not exceed the diameter of the chock.

9.2.8 When to use an additional bottom ring and when an extended Vibracon model?

There is no specific preference for use of one or the other. The only and major difference is that an additional bottom ring introduces another component in the chock whereas the extended model has only 3 components.

9.2.9 When to use an extended top plate?

The extended top plates are a recommended product for application where Vibracon Low Profiles are used and extra chock height is needed or in cases of geometric constraints.

9.2.10 What to do if we want to have chocks which are lower than the minimum height?

It is allowed to reduce the SKF Vibracon Original to a minimum reduced height which is mentioned in the SKF Vibracon datasheet.

Reducing the height can be done on a lathe by machining the Centre and Bottom part of the chock. Keep in mind that the adjustment capabilities also will be reduced. At the minimum reduced height, you will only have 1 mm adjustment capability left.

9.2.11 Can the SKF Vibracon chock be installed upside down?

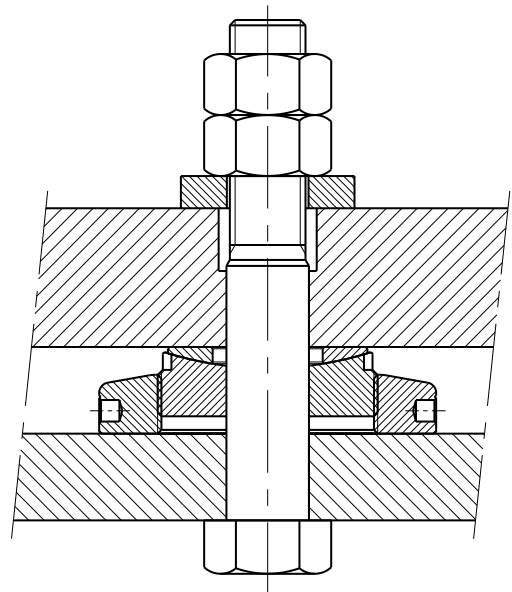
Yes, this is possible and is a perfect solution if the design of the foot or foundation so dictates.

3.8.18 Is it possible to enlarge the bolt hole of the SKF Vibracon chock?

To do so you always need approval from SKF and - for marine applications- the classification society. Based on the specific design, the SKF Vibracon engineering department will provide recommendations.

9.2.12 If we want to use fitting bolts, how should we do this?

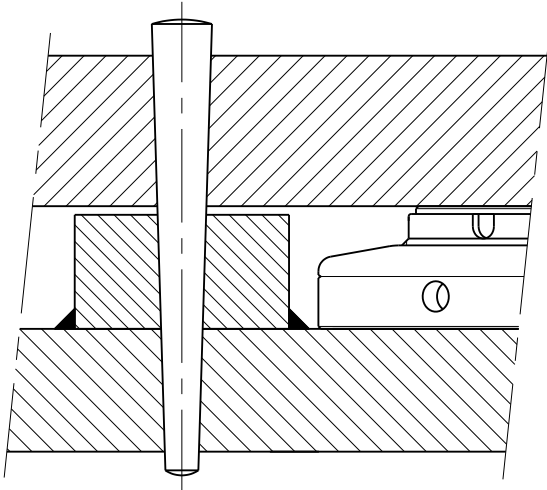
In general, it is not necessary to ream through the SKF Vibracon chock. Reaming only the foot of the machine and the foundation usually will do. In some situations, (for example in cases where no side and collision stoppers are installed) we also advise to ream the SKF Vibracon chocks. In case of the latter it has the recommendation to install the Vibracons upside down in order to prevent the Vibracon to rotate down during reaming.



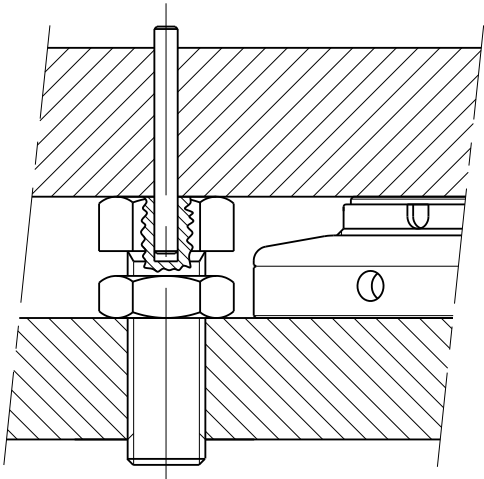
General arrangement for a fitted bolt.

9.2.13 If we want to use dowel pins, how should we do this?

After the alignment and the securing of the foundation bolts, weld down a block of steel (which is just 1 mm lower than the chocks) near at least one of SKF Vibracon chocks or between two chocks. Drill a hole through the foot of the machine into this block. Now the dowel pin can be installed.



Alternatives for a dowel pin application



9.2.14 What information is needed to make a calculation and a sketch of the chocking arrangement?

To obtain a, free of charge, SKF Vibracon chocking proposal it is necessary to fill in a datasheet, which can be found in Appendix 1.

9.2.15 What bolt torque should we apply?

SKF has developed bolt torque calculation software in close cooperation with original equipment manufacturers and classification societies. The philosophy of the calculating software is to reach a minimum bolt elongation (stretch) of 0.20 mm in the bolted connection. The bolts are to be tightened within the elastic range of the bolt material, in general SKF advises a maximum bolt tension related to 75% of the yield strength of the bolt material.

The values stated in our SKF Vibracon brochures are based on the above mentioned calculations rules.

The mentioned values are valid for bolts with course thread, material grade 8.8, yield strength > 630 N/mm², oil lubricated thread courses and nut mating surfaces without slide additives.

As a service to our customers, SKF offers you a chocking proposal, with the advised tightening torque included, for your application **free of charge!**

This and further support can be obtained through vibracon@skf.com.



Appendix 1 - Vibracon checklist (metric)



SKF Maintenance Products

Website: www.vibracon.com

E-mail: vibracon@skf.com

SKF Vibracon element selection sheet

Coloured cells to be filled out

Address information

Company	:	<input type="text"/>
Contact	:	<input type="text"/>
Phone	:	<input type="text"/>
E-mail	:	<input type="text"/>
Preference (metric / Imperial)	:	<input type="text"/>
Customer name	:	<input type="text"/>
Project name	:	<input type="text"/>
Class / Approval type	:	<input type="text"/>
Object	:	<input type="text"/>
Make / type / model	:	<input type="text"/>

Remarks:

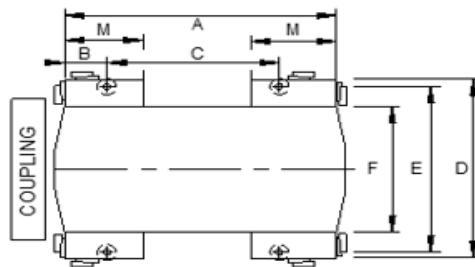
Object overall information

Mass	:	<input type="text"/>	(kg)
Power	:	<input type="text"/>	(kW)
Revolutions	:	<input type="text"/>	(rpm)
Number of foundation bolts	:	<input type="text"/>	(-)
Foundation bolthole diameter	:	<input type="text"/>	(mm)
Number of fitted bolts	:	<input type="text"/>	(-)
Fitted bolthole diameter	:	<input type="text"/>	(mm)

Additional info for gearbox applications:

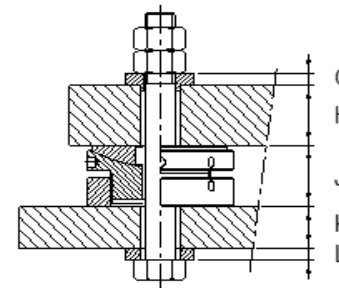
- Reduction rate	:	<input type="text"/>	(-)
- Average distance between bolt holes	:	<input type="text"/>	(mm)
- Height shaft center line - Top plate of foundation	:	<input type="text"/>	(mm)
- Propulsion efficiency	:	<input type="text"/>	(N/kW)

Top View of object



A	Total length of component base	:	<input type="text"/>	(mm)
B	Location first hole (seen from flexible coupling)	:	<input type="text"/>	(mm)
C	Pitch between other holes (on one side)	:	<input type="text"/>	(mm)
D	Total width of component base	:	<input type="text"/>	(mm)
E	Pitch of boltholes (left to right)	:	<input type="text"/>	(mm)
F	Foundation width (inside)	:	<input type="text"/>	(mm)
M	Foot length	:	<input type="text"/>	(mm)

Cross section of mounting detail



SKF recommends the use of a spherical washer in the bolt connection at position L:

- to compensate for angular errors;
- to increase the clamping length;
- eliminate bolt bending;
- to avoid spot facing.

SKF Spherical Washer	:	<input type="text"/>	(yes/no)
Bolt tightening from top	:	<input type="text"/>	(yes/no)

G	Top sleeve length foundation bolt	:	<input type="text"/>	(mm)
H	Bed plate thickness	:	<input type="text"/>	(mm)
J	Chock height	:	<input type="text"/>	(mm)
K	Top plate thickness	:	<input type="text"/>	(mm)
L	Bottom sleeve length foundation bolt	:	<input type="text"/>	(mm)
G	Top sleeve length fitted bolt	:	<input type="text"/>	(mm)
L	Bottom sleeve length fitted bolt	:	<input type="text"/>	(mm)

Appendix 2 - Vibracon checklist (imperial)

SKF Maintenance Products

Website: www.vibracon.com

E-mail: vibracon@skf.com



SKF Vibracon element selection sheet

Colored cells to be filled out

Address information

Company	:	<input type="text"/>
Contact	:	<input type="text"/>
Phone	:	<input type="text"/>
E-mail	:	<input type="text"/>
Preference (metric / imperial)	:	<input type="text"/>
Customer name	:	<input type="text"/>
Project name	:	<input type="text"/>
Class / Approval type	:	<input type="text"/>
Object	:	<input type="text"/>
Make / type / model	:	<input type="text"/>

Remarks:

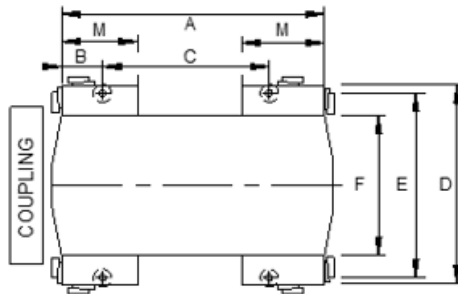
Object overall information

Mass	:	<input type="text"/>	(lbs)
Power	:	<input type="text"/>	(kW)
Revolutions	:	<input type="text"/>	(rpm)
Number of foundation bolts	:	<input type="text"/>	(-)
Foundation bolt hole diameter	:	<input type="text"/>	(inch)
Number of fitted bolts	:	<input type="text"/>	(-)
Fitted bolt hole diameter	:	<input type="text"/>	(inch)

Additional info for gearbox applications:

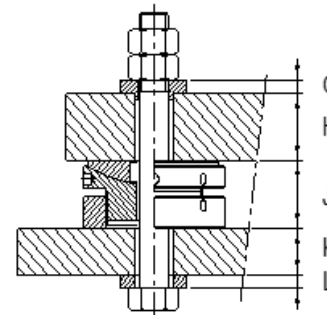
- Reduction rate	:	<input type="text"/>	(-)
- Average distance between bolt holes	:	<input type="text"/>	(inch)
- Height shaft center line - Top plate of foundation	:	<input type="text"/>	(inch)
- Propulsion efficiency	:	<input type="text"/>	(N/kW)

Top View of object



A	Total length of component base	:	<input type="text"/>	(inch)
B	Location first hole (seen from flexible coupling)	:	<input type="text"/>	(inch)
C	Pitch between other holes (on one side)	:	<input type="text"/>	(inch)
D	Total width of component base	:	<input type="text"/>	(inch)
E	Pitch of bolt holes (left to right)	:	<input type="text"/>	(inch)
F	Foundation width (inside)	:	<input type="text"/>	(inch)
M	Foot length	:	<input type="text"/>	(inch)

Cross section of mounting detail



SKF recommends the use of a spherical washer in the bolt connection at position L:

- to compensate for angular errors;
- to increase the clamping length;
- eliminate bolt bending;
- to avoid spot facing.

SKF Spherical Washer	:	<input type="text"/>	(yes/no)
Bolt tightening from top	:	<input type="text"/>	(yes/no)

G	Top sleeve length foundation bolt	:	<input type="text"/>	(inch)
H	Bed plate thickness	:	<input type="text"/>	(inch)
J	Chock height	:	<input type="text"/>	(inch)
K	Top plate thickness	:	<input type="text"/>	(inch)
L	Bottom sleeve length foundation bolt	:	<input type="text"/>	(inch)
G	Top sleeve length fitted bolt	:	<input type="text"/>	(inch)
L	Bottom sleeve length fitted bolt	:	<input type="text"/>	(inch)