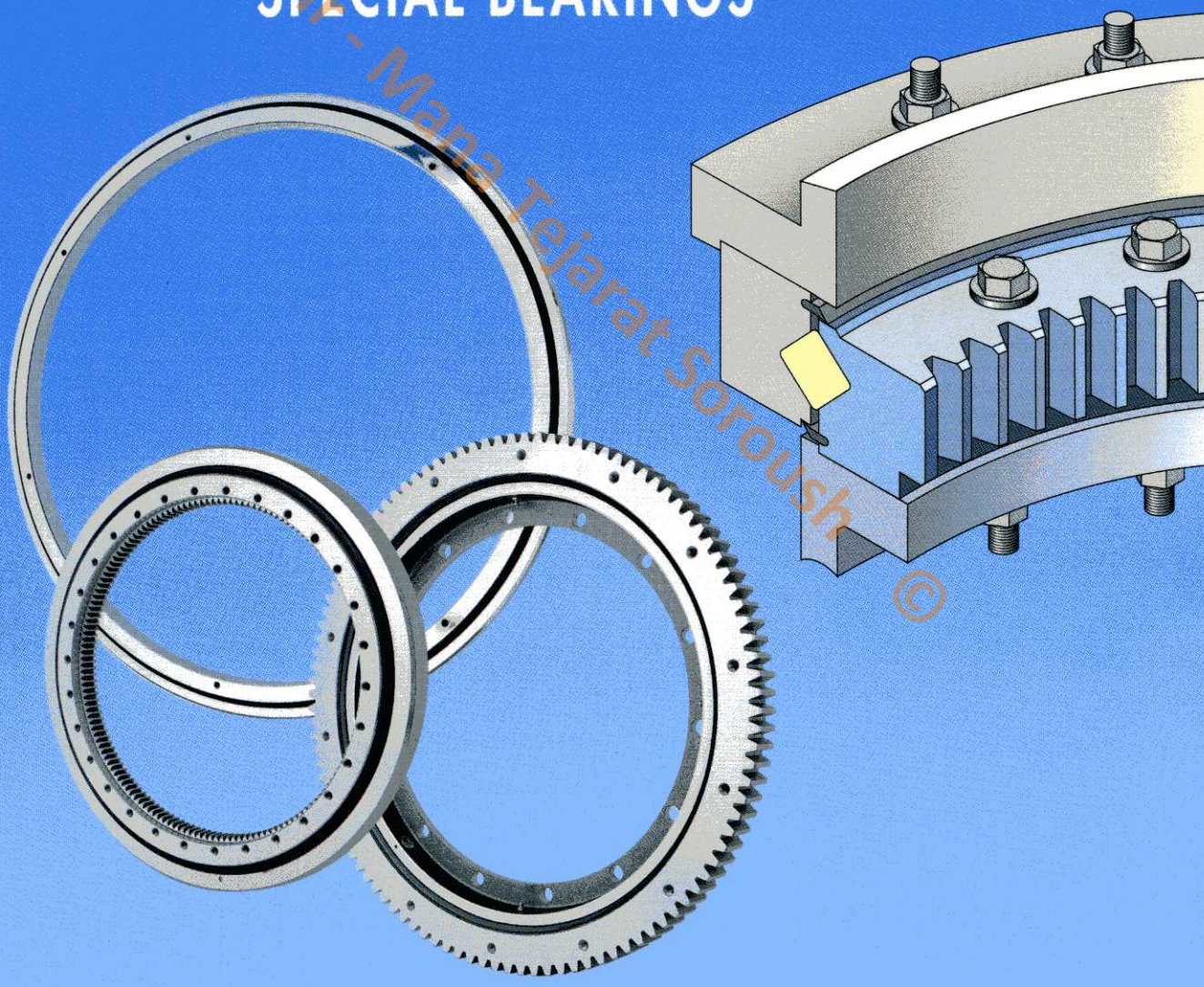
ROLLIX®

SLEWING RINGS
SPECIAL BEARINGS

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DEFONTAINE GROUP



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ROLLIX
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FR – 44803 SAINT HERBLAIN Cédex
Tel +33 (0) 2 40 67 89 89
Fax +33 (0) 2 40 67 89 03
info@rollix.com

Rollix, a department of the Defontaine group, have designed and manufactured special bearings and slewing rings from 100 to 4500 mms diameter, with and without gear, since 1974.







90% of our production is exported to more than 40 countries, in each country.

You will find a Rollix representative or member of our distribution network at your disposal, to help with all aspects of your requirements as quickly and efficiently as possible.

Our engineering and design department will propose you innovating solutions, using the most modern software, as well as calculation by finite elements.

This catalogue specifies the shortest delivery times for standard slewing rings from our stock in France and abroad.

In order to match closely customer's requirements Rollix has developed 2 new ranges of products: "**RLX COMPACT**" for applications requiring high precision and "**RLX-BT**" for bottling industries.

We design parts specifically adapted to your needs and we own several thousands of other references that we keep at your disposal.

Rollix specialises in preloaded slewing rings. Thanks to our process of grinding of the raceway and to systematic matching, we offer you a slewing ring that is as precise as possible throughout its lifetime.

Thanks to simultaneous engineering, we produce a product that answers the most specific requests of the most demanding customers (slewing rings made of titanium, aluminium etc...)

Your most severe requirements (loads, tightness, speed, noise etc...) are validated on our test benches.

Our ISO 9001 and ISO 14000 certification guarantees a product designed and produced according to the rule book.

Our slewing rings conform to standards DNV, LLoyd, GL etc, which are recognized worldwide.

ROLLIX

WE KEEP THE WORLD TURNING



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WORLD-WIDE LOCATIONS



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ROLLIX

ROLLIX is represented in the following countries :

ARGENTINA
AUSTRIA
AUSTRALIA
BELGIUM
BRAZIL
CANADA
CHINA
CZECH REPUBLIC
DENMARK
EGYPT
ESTONIA
FINLAND
GERMANY
GREAT BRITAIN
GREECE
HONG-KONG
INDIA
IRAN
IRELAND
ISRAEL
ITALY
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LATVIA
LITHUANIA
MALAYSIA
MEXICO
MOROCCO
NETHERLANDS
NEW ZEALAND
NORWAY
PHILIPINNES
POLAND
PORTUGAL
RUSSIA
SLOVAKIA
SOUTH AFRICA
SPAIN
SWEDEN
SWITZERLAND
TAIWAN
THAILAND
TURKEY
UNITED STATES

For any further information, please contact :

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info@rollix.com
www.rollix.com

SLEWING RINGS
SPECIAL BEARINGS

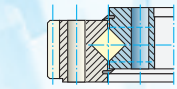
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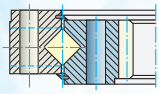
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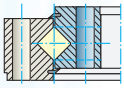
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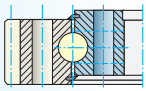
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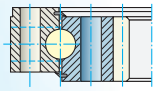
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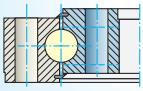

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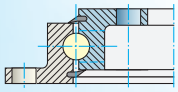

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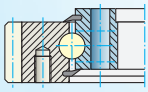

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BUSINESS UNITS AND PRESENTATION

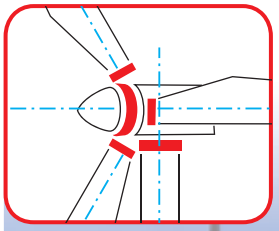
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- WIND TURBINE
- SOLAR
- MEDICAL
- PRECISION
- PUBLIC WORKS
- CRANES
- PACKAGING
- WATER TREATMENT
- OFFSHORE
- MINING
- GREEN INDUSTRY
- HANDLING
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- CAPABILITY

BUSINESS UNIT

WIND TURBINE

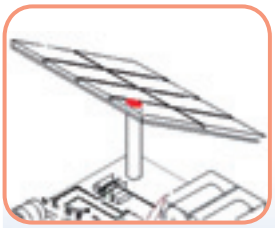


50% of the wind turbines in the world use Rollix slewing rings for blade and yaw. Our design office is specialised to design specific bearings with 20 years life time. Our special sealing system gives completely tight bearings and we can propose integrated bearings with automatic lubrication system. Our finishing by grinding is the state of the art for the double row slewing rings. From 5kw up to 5 MW Rollix supplies all the manufacturers in this field.



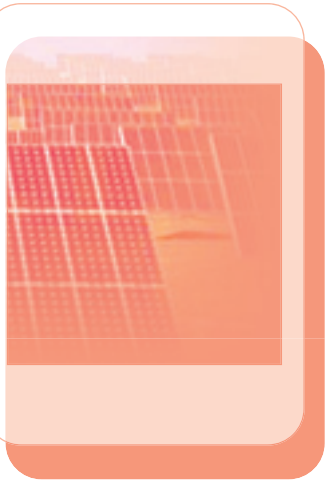


SOLAR



The rotation of the solar panels is a good solution to increase the production of energy. Because of our very compact design, Rollix supplies the biggest solar farms in Europe.





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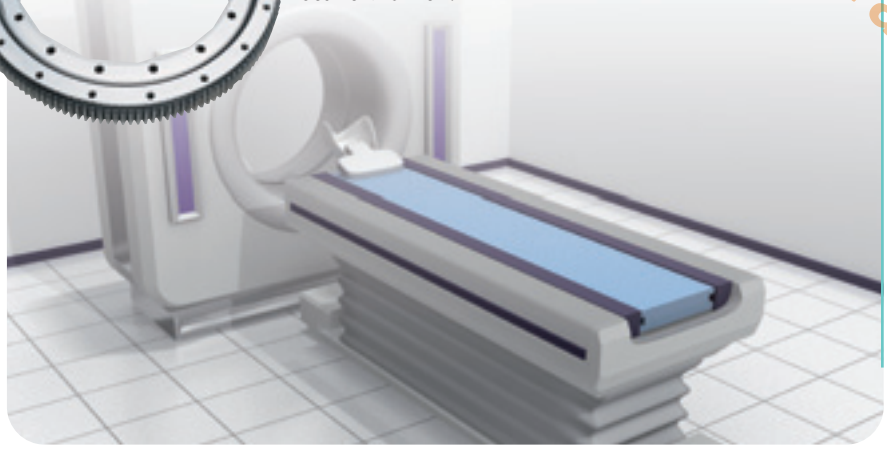
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BUSINESS UNIT

MEDICAL



The Rollix Medical slewing rings are characterised by a high rotating speed, constant rotating torque and low noise under rotation controlled in our anecoïd room. The perfect circle and the high precision of our bearing are the result of our specific finishing and the matching of the rings and the rolling elements. We propose also innovative sealing solutions to avoid any leakage in a clean environment.





PRECISION



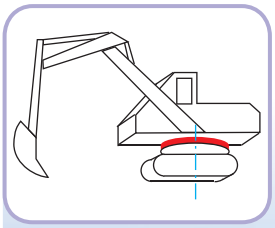
The success of the Rollix slewing ring is the result of the precision of our finishing by grinding. All our production is perfectly under control and the matching of the rings and the rolling elements, gives batch after batch, the certainty to obtain the right bearing for this very demanding application. We propose also motor torque bearings. Our tailor made design follows perfectly the specific requirements of the customers. The most famous worldwide robots and machine tools manufacturers choose Rollix all around the world.





BUSINESS UNIT

PUBLIC WORKS

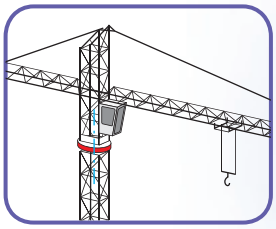


The Rollix slewing ring, a very robust mechanical part, is particularly adapted to these applications. Our process control gives the customer a very simple solution to set up the pinion (see page 45) and to save production time. The most famous worldwide manufacturers choose Rollix for our optimised design and the quality of our service.





CRANES





Because of the light structure of the crane, the Rollix slewing ring is an essential and strategic part. Our design matches perfectly the life time required by the customer. The quality and the precision of our manufacturing is the key to ensure good running after many cranes dismantling. In this application the Rollix slewing ring helps construct buildings everyday all around the world with total security.

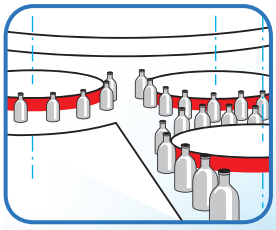


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BUSINESS UNIT

PACKAGING

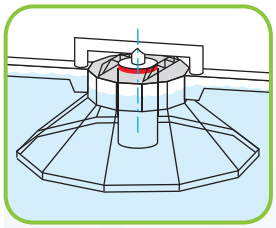


Large diameters and thin sections are the main characteristics of this application. These particular bearings require strict process control. The Rollix slewing rings are very well-known in the world to accept the highest rotating speed and to control the temperature during working 24 hours a day. Our quality gives a very low level of maintenance. The Rollix slewing rings manufacture millions of bottles all around the world everyday.





WATER TREATMENT



Compared with standard bearings, the Rollix slewing ring is a good solution to reduce the assembling time, to simplify the structure and to increase the capacity of the whole system. The high capacity of our gear is the result of our process control. Many towns around the world use our product every day to treat water. Our worldwide company structure gives strong support to customers and to end users.





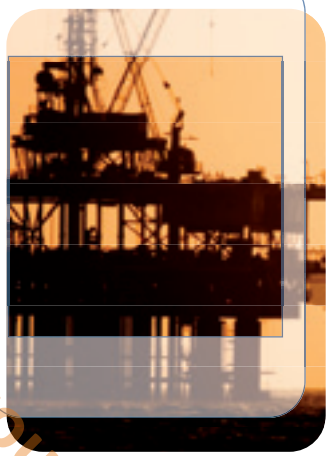
BUSINESS UNIT

OFFSHORE



High speeds, high loads and salty environment require strong and precise components. The Rollix slewing rings is the perfect answer to the offshore industry. Our specific design satisfy the main manufacturers of onboard and harbour cranes, winches, davits and rubber tired gantry cranes as well as propellers. We propose innovative solutions of sealing to completely protect the bearings from the environment. Rollix follows the international certification standards.





MINING



Stacker reclaimers, tunnel boring machines and excavators are very demanding applications. The high capacity of the Rollix slewing rings is obtained by the control of the hardening process of the raceways and the gears. Our logistic department supplies our product everywhere in the world even large diameter slewing rings.





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GREEN INDUSTRY

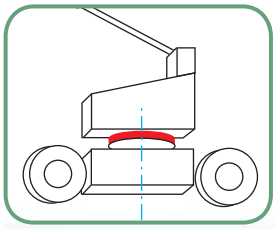


Forest and de-barker machines require strong components. The most famous worldwide manufacturers choose Rollix for our optimised design and the capacity of our slewing rings to work in a tough environment. Our finishing by grinding brings a valid pre-loading which is very important for the life time of the bearing and the comfort of the forest machine's drivers. Our slewing rings accept the shocks and the high rotating speed of the de-barkers as well as the temperature of the coldest forests.





HANDLING



The stiffness of the Rollix slewing ring is a perfect solution for this type of application. Our special design gives very compact bearings, which is essential for this product. Our process control gives the customer a very simple solution to set up the pinion (see page 45) in order to save time during the mounting of the machines.





BUSINESS UNIT

DEFENCE

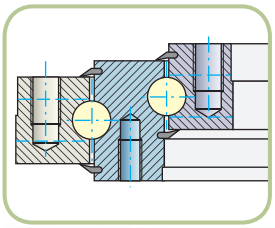


The Rollix slewing ring has a strong reputation for civilian or military applications. We manufacture steel, aluminium and titanium bearings for the most demanding customers in the world. Our precision is obtained by a specific process of grinding. Our design office proposes specific solutions for all types of environments. Capacity, low torque, stiffness and high rotating speed are our main characteristics.





TRANSPORT



The Rollix slewing ring permits the bogie orientation and the carriage articulation. The stress spectrum applied to these slewing rings is very specific. Our know-how answers perfectly the protection from contaminants (salt, sand, rain and mud). We can also integrate special braking devices. The Rollix slewing rings transport millions of people all around the world with train, trams and metro. We also supply slewing rings for the rotation of the truck's wheels.

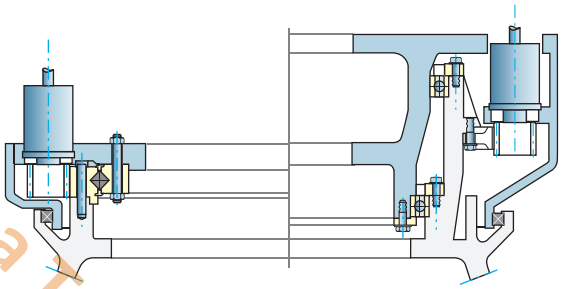




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VARIOUS INDUSTRY

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1



Rollix supplies slewing rings for a wide range of applications throughout the industry. Our design office will assist you to select the most effective solution price and capacity-wise. Our staff and agents worldwide will process your enquiries and provide full support to meet your customer's requirements.









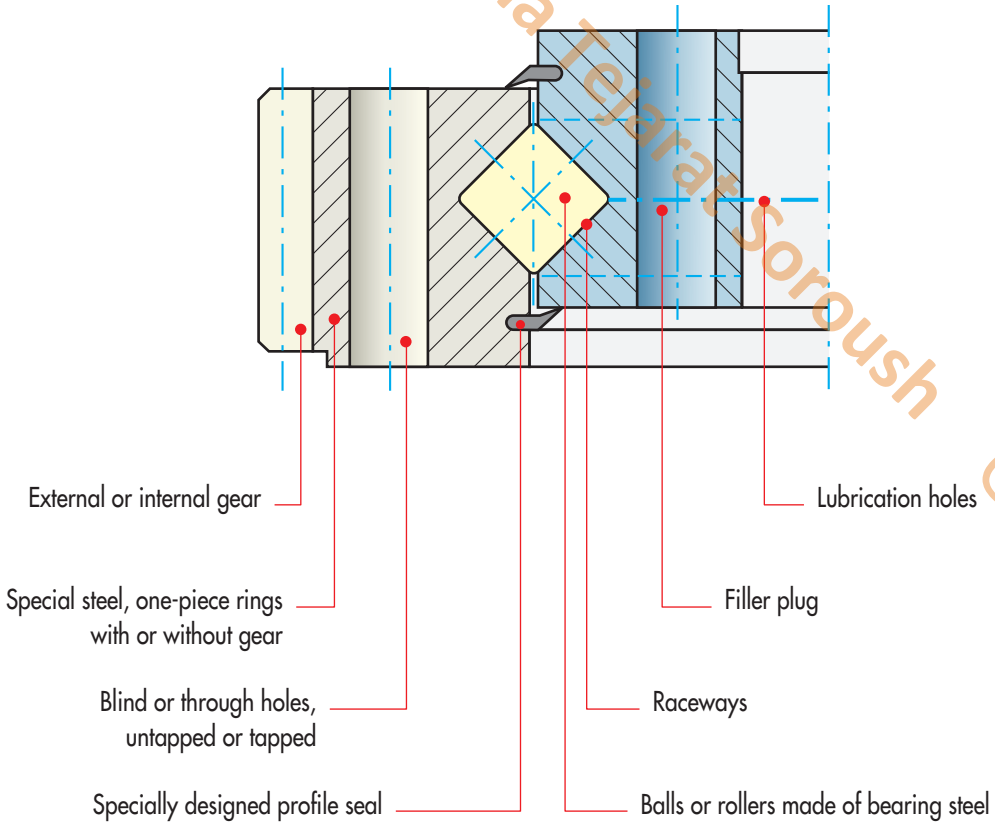


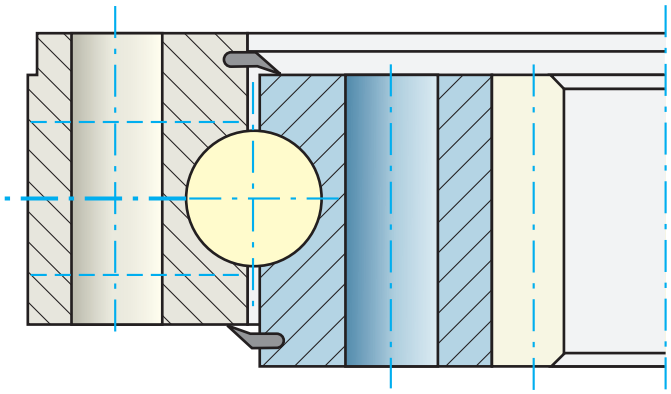
The loads and working conditions defined and gathered by the customer in the **IT ETR 911** data sheet enables the ROLLIX Engineering Department to select the most suitable product.

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CONSTRUCTION

BASIC CONSTRUCTION





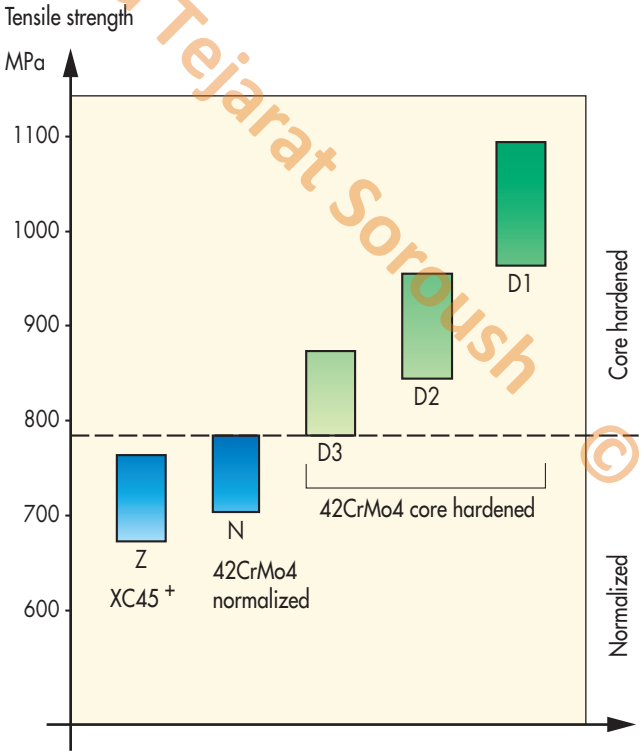
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CONSTRUCTION

MATERIALS

For the slewing ring manufacture, ROLLIX selects the best material specifications to suit most foreseen usages.
These materials are manufactured by approved steel works.
Inspections are carried out at each significant step of manufacturing what makes it possible to warrant the quality of the products. Most of the time, we select high-grade Carbon steels which permit us to meet all operating requirements.
Core hardening and tempering are carried out when the applied stresses dictate these processes.

1



STANDARD GRADES	Normalized state	Core hardened state
Improved XC 45	**Code letter Z**	Code letter X
42 Cr Mo 4	code letter N	**Code letter D**

CONSTRUCTION

MATERIALS

EQUIVALENT STANDARDS IN VARIOUS COUNTRIES :
The following table shows our standard steels with the nearest equivalent foreign grades

COUNTRIES	STANDARD	XC45 Code Z/X	42CrMo4 Code N/D
GERMANY	DIN	Ck 45	42CrMo4
U K	B.S.	080M46	708M40
U.S.A.	AISI	16B45	4142
ITALY	UNI	C45	42CrMo4
JAPAN	JIS	S45C	SNB7
SPAIN	UNE	C45K (F1140)	42CrMo4 (F8232)
SWEDEN	SSSTAHL	1672	2244
AUSTRALIA	ASA	AS 1442-1045	AS 1444-4140

OTHERS MATERIALS :
Specific factors of some applications or functional requirements may result in the use of materials such as :

- Stainless steel.
- Structural hardening steels or alloys.
- Special steels for hardening under controlled atmosphere.
- Case or nitrided steel.
- Special steels for very low temperature.
- Aluminium-based alloys.
- Titanium alloys.
- Plastic, composite materials.

COMPONENTS

ROLLIX selects rolling elements : balls and rollers with very specific characteristics.
Their assembly requires particular caution.
Any action of dismantling bearings or replacement of rolling elements is definitely inadvisable and cancels the ROLLIX warranty.

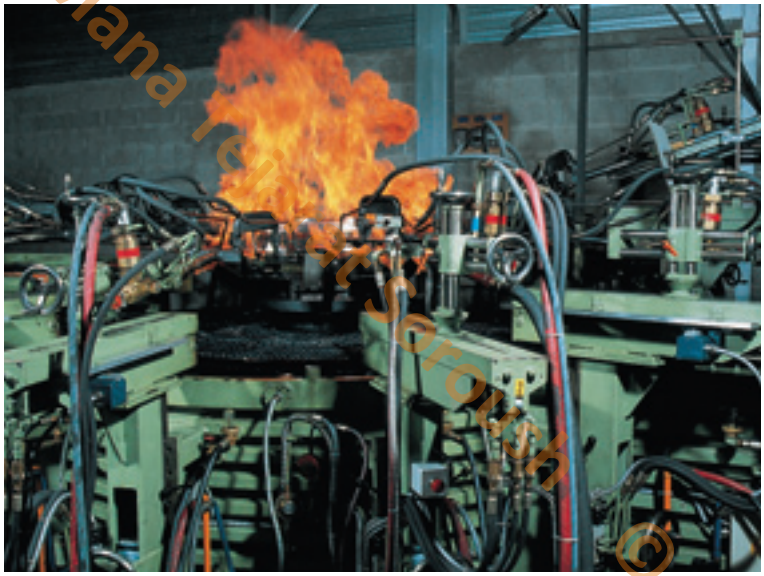
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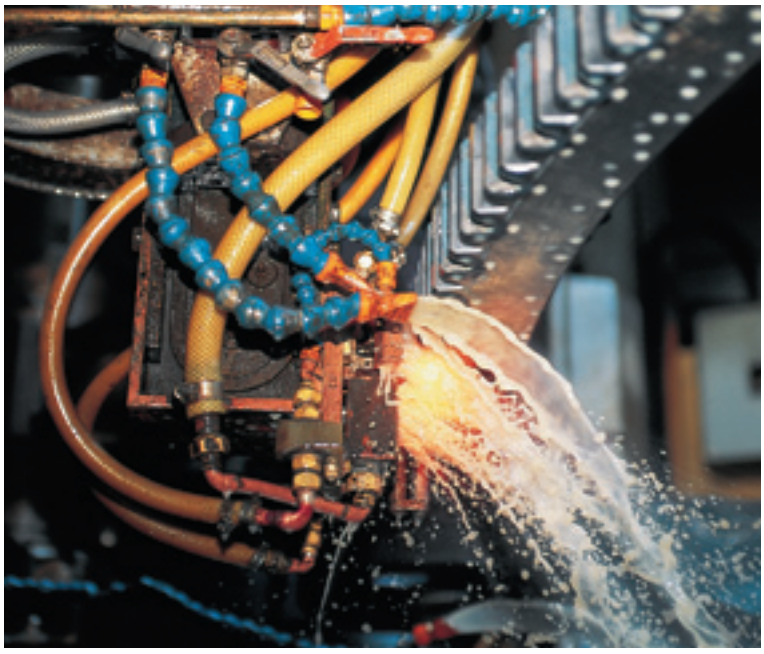
CONSTRUCTION

HEAT TREATMENTS

The slewing ring transmits loads from a turning part towards the fixed part of a mechanism. The applied stresses of the rolling elements on the raceways are calculated according to the Hertz laws and the modern criteria of plasticity.
ROLLIX carries out localized hardening treatments which makes it possible to satisfy these criteria just as well in terms of surface pressure as well as subsurface fatigue.
In all cases, induction or flame hardening permits us to achieve the necessary hardness patterns and a sufficient depth simultaneously.
In process systematic inspections during production enable us to warrant the quality and the reliability of the slewing ring treatment, according to ROLLIX specifications.
According to the level of applied stresses and if geometry allows it, the same kind of hardening process may be applied on **gear teeth.**
Our calculation models allow us to select the kind of treatment required.
Other processes of local hardening may also be provided, for example : case hardening, nitriding, etc.



1



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CAPABILITY

TEMPERATURE

The normal working temperature of the slewing rings ranges from - 25 up to + 70° C. Lower or higher temperatures are possible but require special design provisions by our Engineering Department.

SPEED

The slewing rings can work whether by oscillating motion or continuous motion. It is necessary to check that the circumferential raceway speed remains within the acceptable limits of respective bearing's capacity.

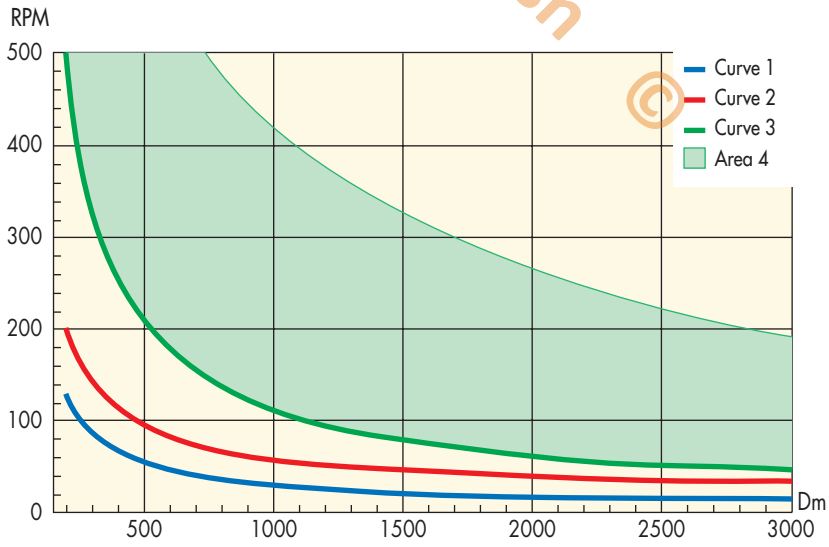
ENVIRONMENT

In case when the working environment is particularly aggressive :
- sea atmosphere,
- dusty or abrasive environment (sand, coal...),

particular protection devices must be incorporated such as :
- labyrinths,
- shields,
- oil-bath.

Preventive maintenance operations will be increased to ensure normal operation.

ROTATIONAL SPEED



BEARING TYPE	LUBRICATION TYPE	LIMITED SPEED (n. Dm)	
Crossed rollers raceway	Standard grease	24 000 to 35 000	Curve 1
Balls type raceway	Standard grease	40 000 to 65 000	Curve 2
Balls type with cage	Grease or oil	70 000 to 130 000	Curve 3
Specific design	Oil or special greases	Consult us	Area 4

SHOCKS, VIBRATIONS

If the slewing rings are continously sollicited by shocks and/or vibrations, the customer must mention it in the specifications in order to design the right piece.

In any case, it is essential to consult our Engineering Department with the precise operating conditions.

SLEWING RING SELECTION

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- SLEWING RINGS FUNCTIONS
- OTHER FEATURES

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SLEWING RING FUNCTIONS

LOADS SELECTION

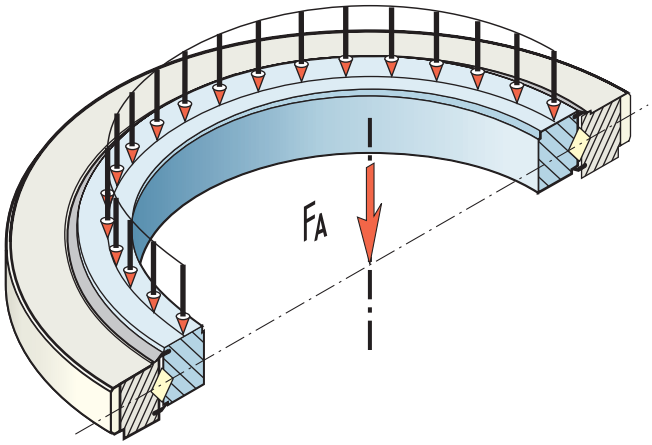
The slewing ring, being the link between a mobile element and a fixed base, must have the capacity to transmit the stresses of the mobile part towards the base. It is necessary to accurately define all the actual stresses applied so that a suitable slewing ring with adequate capacity can be selected. This should include the effects due to masses and inertias of the payloads and structures.

It is necessary to distinguish the fixed loads and the variable loads as well as the effects due to dynamic loads, the latter constituting "fatigue" stresses. The direction of forces affecting the slewing ring must be well defined so that the active tilting moment can be established.

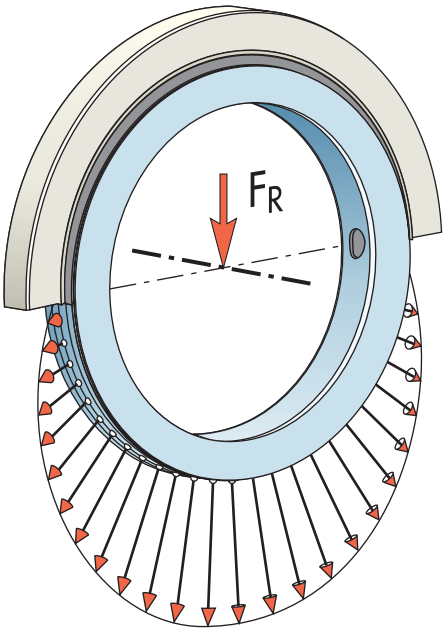
We distinguish :

- **The AXIAL LOADS** whose direction is parallel to the slewing ring rotation axis. The resultant of these loads is called F_A.
- **The RADIAL LOADS** contained in planes perpendicular to the rotation axis. The resultant of these loads is called F_R.

AXIAL LOADS



RADIAL LOADS



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SLEWING RING FUNCTIONS

LOADS SELECTION

• **TILTING MOMENTS** (bending) : in planes parallel to the rotation axis. The resulting moment working in the plane containing the rotation axis is called M_T.

• **SLEWING TORQUE** C_D controls the slewing ring rotation.

CALCULATION OF THE EQUIVALENT LOAD

For the calculation, the resultant of the radial loads F_R is transposed into an equivalent axial load using a factor K_R as follows :

For **standard slewing ring :**

if : $\frac{F_R}{F_A} < 0,25 \longrightarrow K_R = 0,5$

if : $0,25 < \frac{F_R}{F_A} < 1 \longrightarrow K_R = 1,5$

if : $\frac{F_R}{F_A} > 1 \longrightarrow K_R = 2,4$

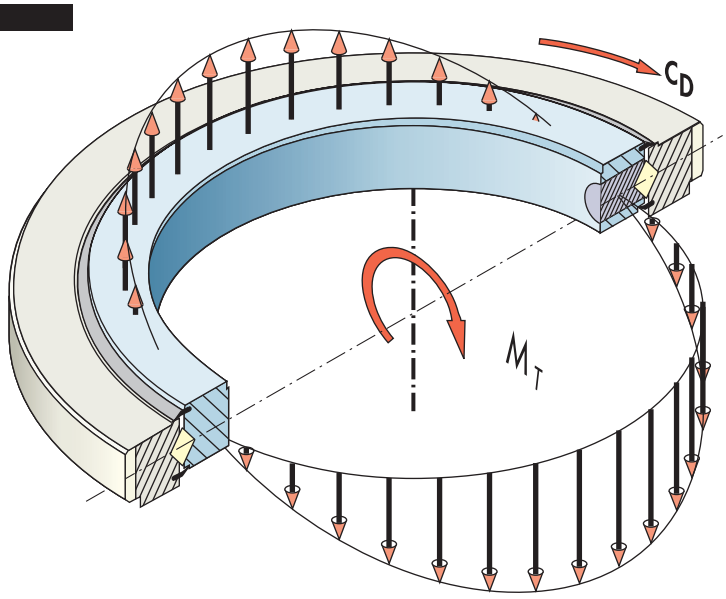
For **light series and solid sections :** $\longrightarrow K_R = 3,225$

The equivalent loads F_{eq} can be obtained by the following formula :

• For **the horizontally mounted slewing rings :** vertical rotation axis :
$F_{eq} = F_A + K_R \cdot F_R$

• For **the vertically mounted slewing rings :** horizontal rotation axis :
$F_{eq} = F_A + 1,2 \cdot K_R \cdot F_R$

TILTING MOMENT



ROLLIX	For ROLLIX	For the USER
3, Rue Louis Renault B.P. 329 F - 44803 ST HERBLAIN Cedex Tel. 33 (0)2 40 67 89 89 Fax 33 (0)2 40 67 89 03 E-mail : Info@rollix.com	N° Affaire : Date : AC ☐ VI ☐ RC ☐ Visa :	Name : Date : Signature :

DESIGN DATA SHEET

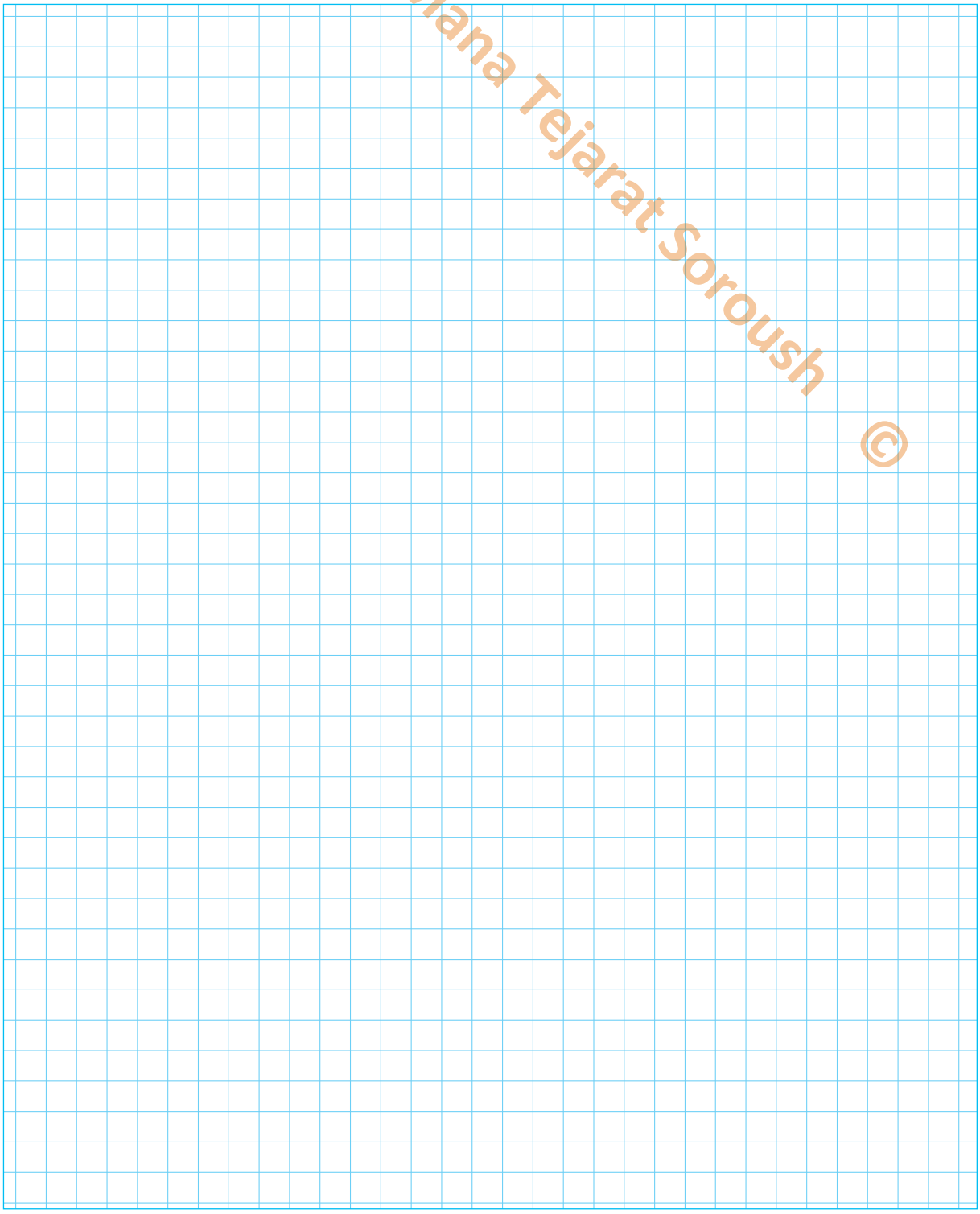
1.1	COMPANY :					Tel. :		
1.2	Address :					Fax :		
1.3	Person in charge of the project :					Fonction :		
2.1	DESCRIPTION OF THE APPLICATION + sketch (to be attached with loads applied)							
2.2	Machine / project reference :					New project : Yes ☐ No ☐		
2.3	Slewing ring position : Horiz. ☐ Vert. ☐ Other ☐ Utilisation mode : Continu. ☐ Intermittent ☐ Other ☐							
3.1	LOADS ON THE BEARING (including structural loads) :					Applied ☐ Suspended ☐		
3.2			Static			Dynamic		
3.3			Nominal	Maximum	Test	Nominal	Maximum	Test
3.4	Utilisation	% Time						
3.5	Axial	kN						
3.6	Radial	kN						
3.7	Moment	kNm						
3.8	Rotating ring : Ext ☐ Int ☐ Speed (RPM)							
3.9	Load factors applied : Excluded ☐ Included ☐ Values :							
3.10	Required life :							
4.1	GEAR External ☐ Internal ☐ Without gear ☐							
	Geometry		S.R.	Pinion		Loads	S.R.	Pinion
4.2	Required Module					Tangentiel load (kN)		
4.3	Number of teeth required					Torque (kNm)		
4.4	Addendum modif. factor							
5.1	CRITICAL ITEMS Dimensions					Others :		
5.2	Classification ☐ Commission ☐ FEM ☐ LLOYDS ☐ API ☐ BV ☐ DNV ☐ Other							
5.3	Specification relative to the application :							
	SPECIFIC REQUIREMENTS OF THE APPLICATION							
6.1	Environment :					Operating temperature :		
6.2	Vibrations, shocks loads :					Storing temperature :		
6.3	Acceleration :	Deceleration :				Inert. mom./Rotation axis :		Varied :
7.1	QUANTITY Yearly requirements :					Qty per delivery :		
8.1	REQUIRED DELIVERY TIME :							

Document available at the Commercial Department

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SKETCH OF YOUR APPLICATION SHOWING THE LOAD POSITIONS



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SLEWING RING FUNCTIONS

BEARING FUNCTION

The knowledge of loads and working conditions is necessary to allow us to design and dimension the "BEARING" function of the slewing ring i.e : movement type, speed, accelerations, temperatures, environment, etc.

The **transmission of loads** from one raceway to another varies according to the nature of applied loads.
In order to calculate the ideal dimensions of the raceway, we define the load equivalent to all external efforts in the most stressed areas.
These loads are corrected by factors according to the application, the usage, etc.
We distinguish between :

- the application factor K_A
- the usage factor K_U
- the safety factor K_S

THE APPLICATION FACTOR K_A
is a coefficient taking into account the application specificity in relation to the slewing ring element.
This factor is established from ROLLIX experience. It is defined in the table "APPLICATION FACTORS".

THE USAGE FACTOR K_U
is defined according to the particular operating conditions : vibrations, shocks, occasional or accidental overloading, etc. If no other value is specified, then the nominal value is taken as 1.

THE SAFETY FACTOR K_S
is defined from standardized criteria for applications which must meet specific regulations such as : FEM, LLOYDS, API... This generally has the value 1, as the designer of the machine must include the regulation factors in the calculation of the loads applied on the bearing.



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SLEWING RING FUNCTIONS

BEARING FUNCTION

APPLICATION FACTORS

MACHINES	Average speed Rpm	Applications factors K_A
Armament turret	1,5	1,5
Bucket	1,5	1,65
Cable shovel	2	1,65
Compacter	2,5	1,80
Concrete mixer	5	2,40
Concrete pump	1,5	1,65
Dragline	1,5	1,65
Dock crane	1	1,65
Fairlead	0,8	1,35
Fork-lift truck	1	1,35
Fork-lift wheel	1,5	1,50
Grabbing crane	1,5	1,80
Heavy winch	2	1,65
Hydraulic lift platform	1	1,50
Hydraulic shovel	2,5	2
Loading dock crane	1	1,65
Merry-go-round	5	2,40
Mine digging machinery	1,5	2
Mobile fixed boom crane	1	1,5
Mobile grapple crane	1	1,80

MACHINES	Average speed Rpm	Applications factors K_A
Mobile telecospic crane	1	1,65
Offshore crane	1	1,8
Post jib crane	1	1,35
Railway crane	1	1,50
Rapid rotation radar	5	2
Rapid rotation scanner	3,5	1,65
Robotics	3,5	1,65
Service deck crane	0,8	1,35
Settler (water and sewage treatment)	0,6	1,35
Slow rotation radar	1	1,35
Slow rotation radiology	1	1,35
Tower crane, slewing jib type	1	1,65
Tower crane, slewing tower type	1	1,80
Track hook crane	1,5	1,80
Truck crane	1	1,50
Turntable	1	1,35
Vibrating compacter	2,5	2
Welding positionner	0,8	1,35
Windturbine	0,8	1,65

These factors are determinated statistically and are based on a large number of observations for each type of application.

The standard parameters retained are as follows :
- Theoretical service life : 6000 hours.
- Work under normal weather conditions.
- Conventional application (and not specific).

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SLEWING RING FUNCTIONS

BEARING FUNCTION

Selection of the ring according to capacity

The load capacity of the slewing ring is calculated according to its performance in function of :

- its geometric envelope,
- the nature of the ring materials,
- the heat treatment carried out,
- the nature, the number and the dimension of the rolling elements,
- the contact parameters of the rolling elements.

The curve of the maximum permissible capacity is drawn on a graph whose Ox axis bears the equivalent axial load and the Oy axis bears the tilting moment. To simplify it, it is represented by a straight line called the "LIMIT CURVE".

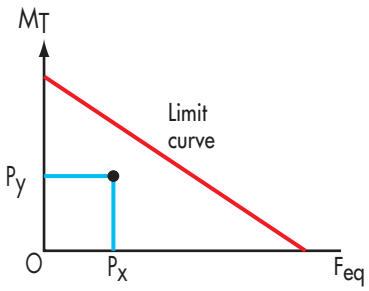
The ring size is determined by plotting the representative point of loads onto this curve. This point, called "appli-cation point" has the following coordinates :

- on the horizontal axis :

$$P_X = F_{eq} \cdot K_A \cdot K_U \cdot K_S$$

- on the vertical axis :

$$P_Y = M_T \cdot K_A \cdot K_U \cdot K_S$$



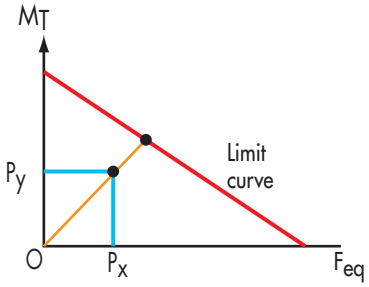
In any case, the application point P must be under the limit curve.

Service life

Many external factors have a very important influence on the service life of the bearing. Among others, we can cite :

- geometric quality of supports,
- structure deformation under load,
- climatic conditions and environment,
- quality of operating maintenance
- conditions of use :

repeated exposures to shocks, vibrations or sudden or intermittent movements can considerably reduce the theoretical service life.



$$K_T = OL / OP$$

An estimate of the theoretical service life can be obtained by comparing the application point to the limit curve : the ratio OL/OP is called K_T.

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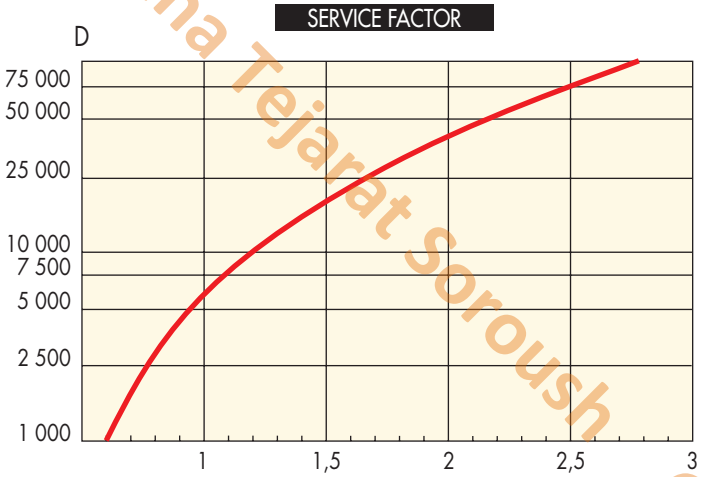
SLEWING RING FUNCTIONS

BEARING FUNCTION

Service Life

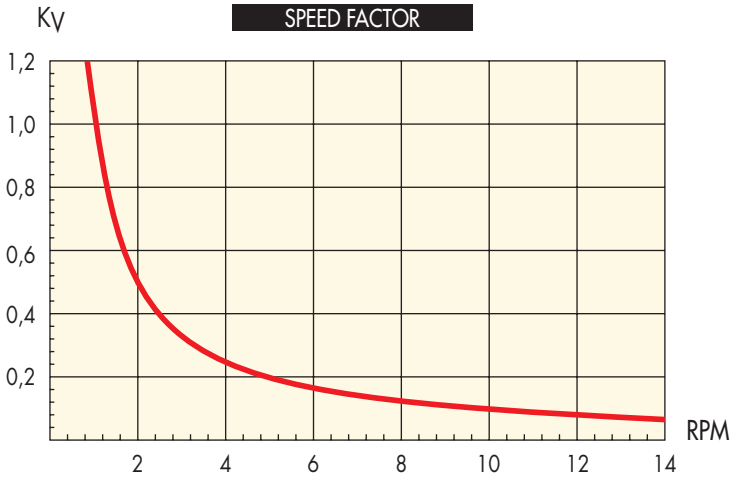
An estimate of the service life D can be obtained using the opposite graph :

• The curve indicates the estimated service life (hours) directly from the K_T value on the horizontal axis.



Rotational speed influence

The service life D, estimated on the graph is only valid for the applications having a low rotational speed : 1 RPM. The value obtained must be multiplied by the **speed factor K_V** indicated on the opposite graph when speeds differ from this.



$D(n) = K_V \times D$

For applications having oscillating movements, the following formula applies :

$n_{average} = 0,60 \times n_{real}$

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SLEWING RING FUNCTIONS

FASTENING FUNCTION

In order to transmit the loads previously defined, it is necessary to realize an adequate mechanical fastening of the bearing on the associated frames, thus forming rigid connection of the ring and its supports.
While several fastening methods are feasible, the most efficient one remains the use of screws and nuts.
Welding operations are absolutely prohibited.
The slewing ring proper functioning and the application safety are dependent on the correct bolting definition and fastening method during installation, complying with our workmanship.

BOLTS QUALITY
The ISO 898-1 standards define the bolting grade adapted to structure assemblies such as slewing rings.
ROLLIX recommends the use of **HIGH TENSILE bolts grade 10.9** and exceptionally grade 8.8 or 12.9 with rolled threads after heat treat.

The **nuts** must be of a same or higher grade as the associated screw. For a screw diameter d, a nut height of 1.d is recommended.

For rings in normalized steel Z or N, the use of **hardened flat washers** is required.
Minimal properties should be :
• a yield strength greater than or equal to 600 Mpa,
• a diameter : D_R = 2 d,
• a thickness : h ≥ 0,3 d

External hexagon head screws must be preferred to cap screws (internal hexagon) whenever possible.
ROLLIX recommendation : screws and nuts, with guaranted mechanical properties, matched, prelubricated so as to obtain a **known** and permanent screw/nut friction factor. The surface coating on the bolts must not generate any embrittlement.

Minimal mechanical characteristics (according to ISO)

GRADE	TENSILE (MPa)	YIELD (MPa)	FATIGUE (MPa)	
8.8	800	640	40	**Exceptional**
10.9	**1040**	**940**	**40**	**Recommended**
12.9	1220	1100	**40**	**Exceptional**

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SLEWING RING FUNCTIONS

FASTENING FUNCTION

BOLTING CALCULATION

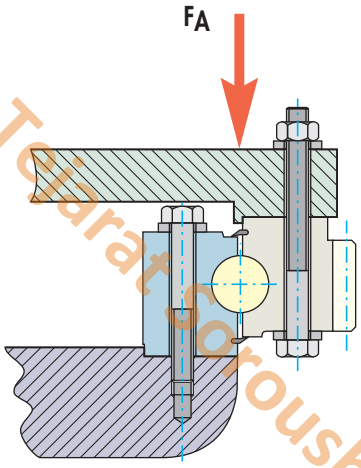
The ROLLIX calculation formulae take into account the current standards and regulations as well as the many research and experimental findings. These calculations are mainly inspired by the AFNOR FD E 25.030, the recommendation VDI 2230 (1988) and the standard API 2C (1995).

Supported loads must be distinguished from hanging (suspended) loads acting in tension.
Consult ROLLIX, in the case of hanging (suspended) loads .

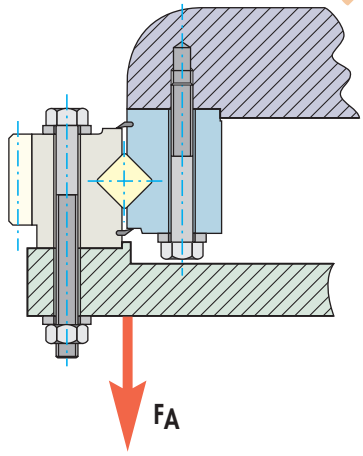
Standard calculation hypotheses

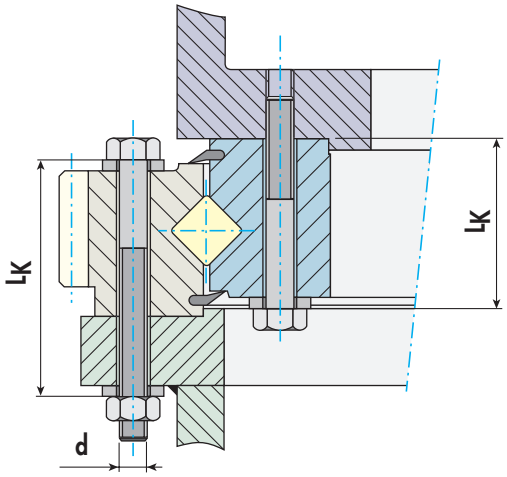
- Supported loads acting in compression.
- Equispaced bolts ; i.e equally positioned on the pitch circles.
- Steel rings and supports.
- Supports complying with our instructions : thickness, stiffness, surface eveness *(see chapter STRUCTURES page 42)*.
- Rings bolted directly onto its supports.
- In cases of heavy radial loads, we recommend to use pilots or to glue so that bolts will not be subjected to shear stresses.
- **The clamping length must be at least equal to five times the diameter : $L_K \geq 5.d$.**

SUPPORTED LOAD



HANGING LOAD





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SLEWING RING FUNCTIONS

FASTENING FUNCTIONS

Calculation of the number of bolts

When the ring has been previously selected according to its utilization and its load capacity, the bolting is then determined to correspond to the bearing capacity. The calculation of the minimum number of fasteners is carried out according to the following formula for the **most unfavourable** load case. In any case, a sufficient number of bolts ensuring an effective connection between ring and support frames must be kept, in order to avoid any ring deformation.

$$N = \frac{1{,}6 \cdot F_K \,(\, 4 \cdot M_T - F_A \cdot D_f \,)}{D_f \,(\, T_s \; - \; F_{pc} \,)}$$

where :

N = Number of bolts theoretically necessary.

1,6 = Tightening factor (assembly error factor) for torque wrench Grade B according to FD E 25-030.

F_k = Bolt stretch factor, see sketch.

M_T = Total tilting moment applied to the ring in kNm.

F_A = Axial load in kN.

D_f = Fastener pitch circle diameter in m.

T_s = Tightening tension.

d = Bolt diameter in mm.

Ø m = Raceway mean diameter in m.

F_{pc} = Loss of tension due to embedding in kN, see graph.

L_k = Clamping length in mm.

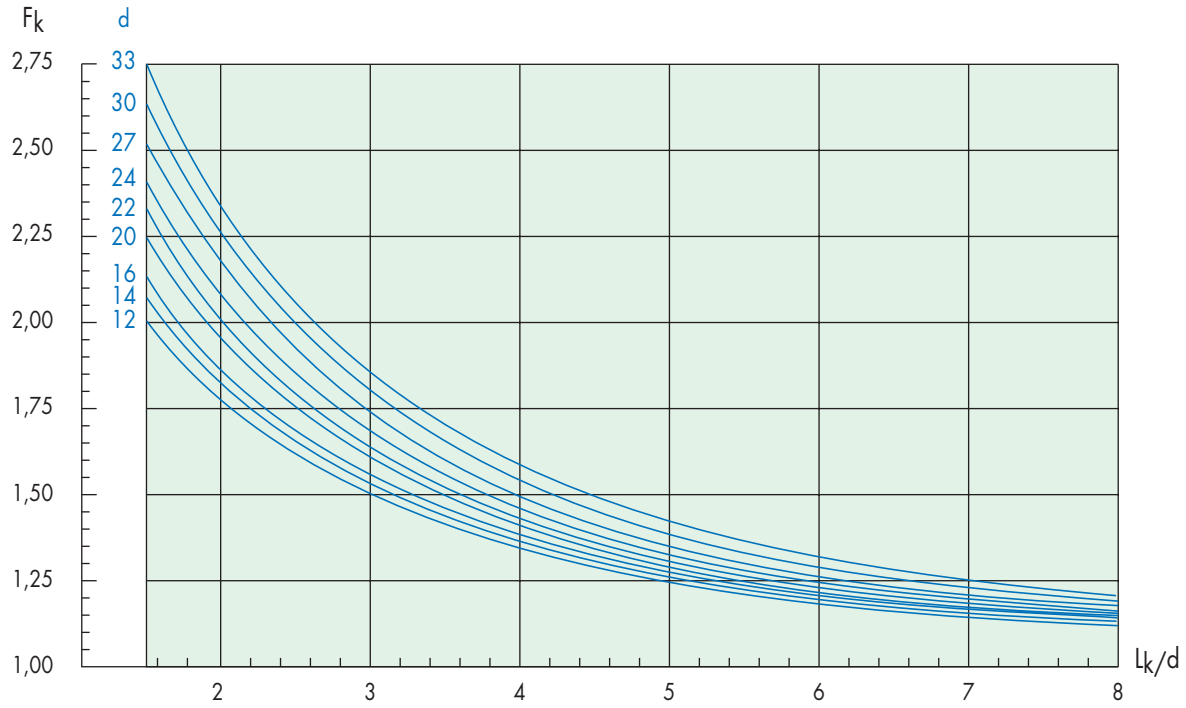
Bolt stretch factor F_k

This factor takes the assembly geometry into account. It is based on the bolt diameter and the ratio of clamping length to diameter.

The best fastening is obtained with through-holes in the ring and the supports : by using screws and nuts, the clamping length is long, bolt stiffness is satisfactory and tension losses are minimised.

In case of screw fastening into tapped holes, the setting depth must not be less than 1.25.d.

BOLT STRETCH FACTOR



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SLEWING RING FUNCTIONS

FASTENING FUNCTIONS

Tightening tension : T_S
Tightening tension of fastening bolts must be sufficient to warrant the absence of looseness which is essential to ensure the resistance of the assembly fatigue.

Calculation of the minimum fastener preload :
It is useful to check that the standar-dized preload of the chosen bolt diameter is sufficient compared to the dynamic stresses imposed when operating.

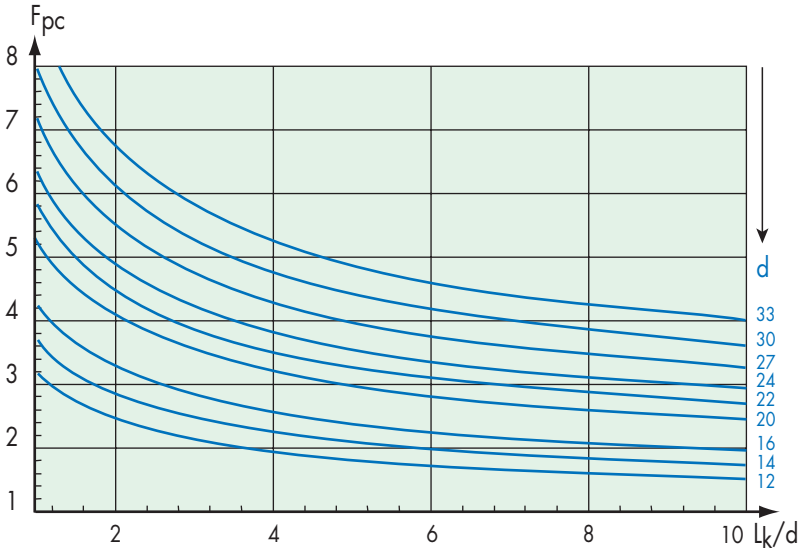
$$T_S > \left(\frac{2,25}{N}\right)\left[\left(\frac{4.M_T}{\varnothing m}\right) - F_A + 80\ N.d.10^{-3}\right]$$

The standardized tightening tension at 80% of Re must be selected from the following table according to the chosen bolt diameter : bolting grade 10.9.

Diameter (mm)	12	14	16	20	22	24	27	30	33
Tension (kN)	56	77	106	166	208	239	315	385	480

Loss of tension :
During tightening and under external loads, peening of the surface roughness of the contact parts occurs, reducing the initial bolts elongation and thus producing a loss of tension, which decreases the preload in the assembly. This loss of tension has been tabulated on the following graph which shows values in function of diameter **d** and the ratio L_k/d.

LOSS OF TENSION



Calculation of under head contact pressure :
Usually, this calculation is not required when treated flat washers are used. It is however recommended when cap screws are used. (Chc).

We must have :

$$\frac{F_{B\ max}}{A_c} < P\ adm$$

with

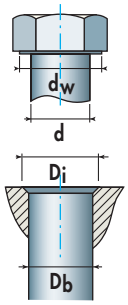
$$F_{B\ max} = T_S + 0,13.F_E$$

with

$$F_E = \left(\frac{1}{N}\right)\left[\left(\frac{4.M_T}{\varnothing m}\right) - F_A\right]$$

and

$$A_c = \left(\frac{\pi}{4}\right)\left(d_w^2 - D_i^2\right)$$



Allowable pressure :

for steels N and Z	400 MPa
for steels D and X	620 MPa
for steels type E36	270 MPa

IMPORTANT REMARK
The use of **elastic washers** whatever the type or model is **absolutely prohibited** and will void all warranty.

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SLEWING RING FUNCTIONS

SLEWING FUNCTION

ROLLIX slewing rings generally incorporate a SLEWING mechanism to control rotation of the mobile part. This function can be achieved by various means :

1. gear drive (the most frequent case)
2. belt drive
3. chain drive
4. direct drive

GEAR DRIVE

Involute teeth, spur or helical are directly cut into the outer or inner ring (spur gear only).

GEOMETRY

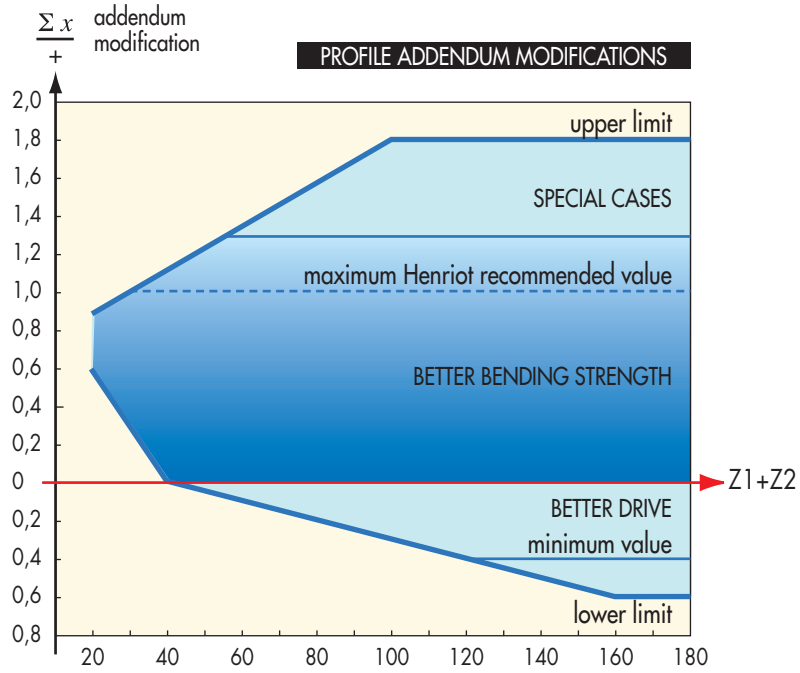
Most of the ROLLIX bearings have a gear improved by **positive addendum modification** which notably decreases pressures as well as by **a truncation** avoiding teeth root interference at the pinion.
It is also essential to make a positive addendum modification on the pinion teeth, in order to avoid the geometric interference which appears under 18 teeth.
Furthermore, the drive stresses induce shaft bending and gear deformation which are harmful to good meshing.
To prevent these faults, we recommend profile corrections be carried out on the pinions : i.e.crowning and tip relief.
Our Engineering Department will assist upon request.

RESISTANCE

Our rating graphs indicate the values of allowable **maximum tangential force** in fatigue T.
The continuous operating capacity is obtained by the application of a suitable load moderating factor.

$$T = 2\,\frac{C_D}{D_{ref}}$$

C_d = Torque on gear
D_{ref} = Reference diameter
Unless otherwise stated, the indicated values are valid for geared rings made of normalized steel XC45 : code Z.
When these values are not sufficient, ROLLIX can proceed with contour hardening which considerably improves the resistance to tooth root bending and the resistance to contact pressure. For very heavy loading conditions, ROLLIX carries out complete hardening of the tooth and of its root in the wheel rim. When only a better wear resistance is required, surface hardening of tooth flanks only is possible.



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SLEWING RING FUNCTIONS

SLEWING FUNCTION

GEAR QUALITY

Unless stated otherwise, ROLLIX manufactures slewing ring gears according to AFNOR or DIN standards which meet the following criteria :

WITHOUT SUPERFICIAL HEAT TREATMENT

DIN class	AFNOR class	Maximum diameter	Maximum module	Options
12	12	all sizes	25	Module 45 with special tooling
10-11-12	11-10-9	all sizes	20	
9-10	8-9	3100	22	Specific equipment necessary
7-8	7	2500	20	• made upon request

When a higher gear quality such as grade 5 or 6 is needed, gear grinding becomes necessary (ask our Engineering department).

SUPERFICIALLY HARDENED GEAR

• Generally, by contour hardening to 55 HRc (± 5).

• The gear classes stated above are offset and ROLLIX can meet AFNOR or DIN standards for grades 11-12.

IMPORTANT

ROLLIX considers that the relevant gear characterizing parameters for each quality class defined by AFNOR, DIN or ISO must be met. In case a customer does not require all of the parameters and needs to meet only one or two of them, ROLLIX can achieve higher qualities.

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OTHER FEATURES

PRECISION - TOLERANCES

Standard ring tolerances are generally defined according to ISO 286-1 and 2 standards.
For applications requiring a higher precision level : robotics, radars, etc. a better grade is considered. The tolerance values are then indicated on the bearing drawing. For bearings of large diameter with thin cross sections where radial stiffness is low, the tolerance values must be considered when bearing is assembled to its supports, these ensuring proper circularity.

GEOMETRY

The selected criteria are :
- For the diameters : **Js 13**
- For the centerings

Bores : **H9**
Shafts : **f9**
- For the overall height : ± **1 mm**

FASTENING

The bolt circle diameters are machined to tolerance **Js10** with a minimum of ± **0,2 mm**.

GENERAL TOLERANCES TABLE (ACCORDING TO ISO 286-2)

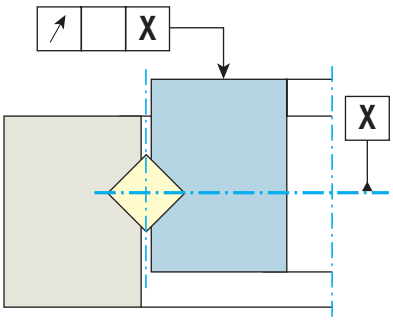
Diameter (in mm)	from 180 to 250	250 315	315 400	400 500	500 630	630 800	800 1000	1000 1250	1250 1600	1600 2000	2000 2500	2500 3150
Pilot H9 (in µm)	+115	+ 130	+140	+155	+175	+200	+230	+260	+310	+370	+440	+540
Spigot f9 (in µm)	- 50 - 165	- 56 - 185	- 62 - 202	- 68 - 223	- 76 - 251	- 80 - 280	- 86 - 316	- 98 - 358	- 110 - 420	- 120 - 490	- 130 - 570	- 145 - 685
Diameter Js10 (in µm)	± 92	± 105	± 115	± 125	± 140	± 160	± 180	± 210	± 250	± 300	± 350	± 430
Diameter Js13 (in mm)	± 0,36	± 0,405	± 0,445	± 0,485	± 0,55	± 0,625	± 0,70	± 0,825	± 0,975	± 1,15	± 1,4	± 1,65

GEAR

The value of the total run-out is indicated in the drawing title block. The measurement and tolerance over K teeth are also indicated on the drawing. This dimension includes the contribution of the ring to the meshing backlash.

BEARING

- The AXIAL RUN-OUT of the supporting faces is measured using a dial gauge over one full revolution (see opposite sketch).

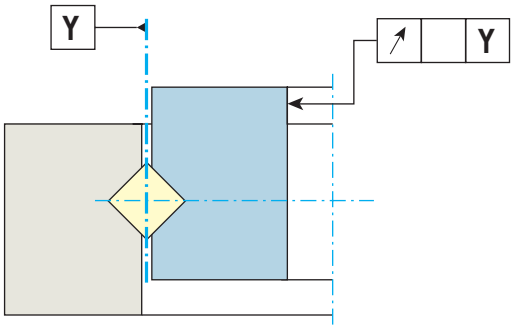


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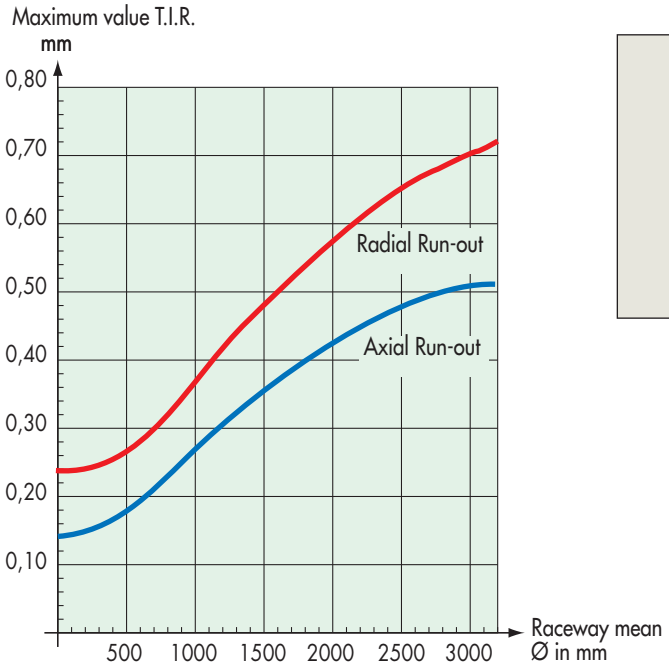
OTHER FEATURES

PRECISION - TOLERANCES

• THE RADIAL RUN-OUT of the spigots is also measured by rotation (following sketch).

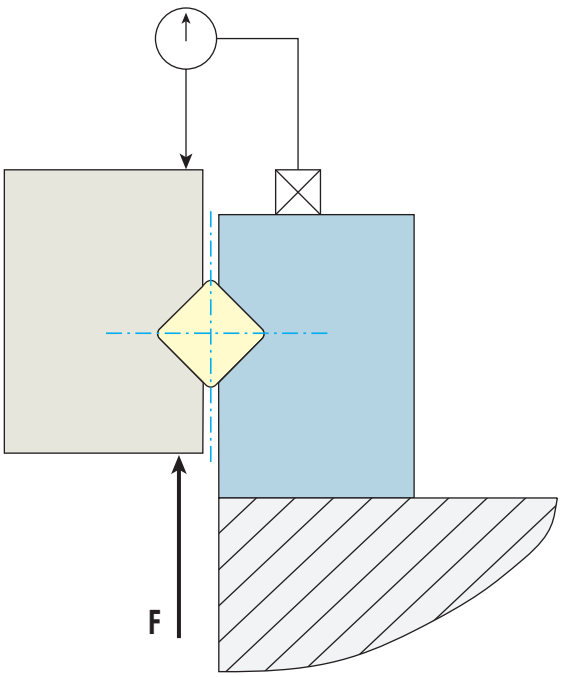


These measurements are carried out by placing the magnetic base of a dial gauge on the fixed ring, while the filler is taken in contact with the element to be measured. The reading will be obtained during one rotation of the turning ring (value T.I.R).



• THE DEFLECTION UNDER MASTER LOAD is measured as follows :
One of the bearing ring is fastened to a rigid support and a master load **F** is applied axially on the other ring to a point closely located to the raceway.
The deflection under load F is measured using a dial gauge whose base is attached to the other ring.
The deflection under standard load of every slewing ring is measured at the factory.
This value is compared to the allowable limits, and is registered.

DEFLECTION UNDER MASTER LOAD



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OTHER FEATURES

SLEWING TORQUE

Calculation of the necessary torque to enable a rotation of the whole assembly takes into account :

- loads on the machine,
- rotating masses,
- distance of these masses to the rotation axis,
- speeds and accelerations,
- resisting torques.

Two types of torques are distinguished :

Start up slewing torque : **Cd = Crv + Crc**

Acceleration slewing torque : **Cg = Crv + Crc + Ca**

Crv = Friction torque of unloaded bearing

Crc = Rotating torque due to loads

Ca = Acceleration torque

Cd = Starting torque

All these torques are expressed in kNm.

Crc : ROTATION TORQUE DUE TO LOADS

The starting torque required takes into consideration loads on the bearing and friction of the components.

Balls type slewing ring

$$Crc = \left[\frac{13{,}11\ M_T}{Ø\ m} + 3\ F_A + 11{,}34\ F_R \right] Ø\ m\ .\ 10^{-3}$$

Crossed rollers type slewing ring :

$$Crc = \left[\frac{15{,}3\ M_T}{Ø\ m} + 3{,}75\ F_A + 8{,}19\ F_R \right] Ø\ m\ .\ 10^{-3}$$

M_T = Resulting moment in kNm

Ø m = Raceway mean Ø in meters

F_A = Axial load in kN

F_R = Radial load in kN

Ca : ACCELERATION TORQUE

The torque needed to accelerate the loads from the initial speed up to the final speed, during time (t) is defined by :

$$Ca = \frac{\pi\ .\ n\ .\ I}{30\ .\ t}\ .\ 10^{-3}$$

t = Acceleration time in sec.

n = Speed variation in RPM
(Final speed - Initial speed)

I = Moment of inertia of the machine in Kg . m^2

$I = I_1 + I_2 + I_3 + ... I_n$

where I_1 à I_n = moments of inertia of the moving loads with regard to the rotation axis expressed in Kg . m^2.

Generally we have :

$I_1 = G_1 \times r_1^2$

$I_n = G_n \times r_n^2$

G_1 to G_n = Mass of various rotating components expressed in Kg.

r_1 to r_n = Distances between the loads centre of gravity and the ring rotation axis expressed in meters.

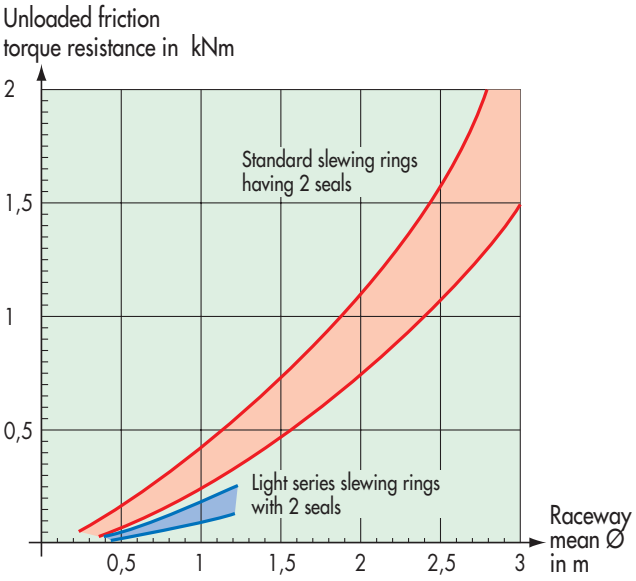
Note : *The resisting torque depends on the support surface flatness and lubrication.*

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OTHER FEATURES

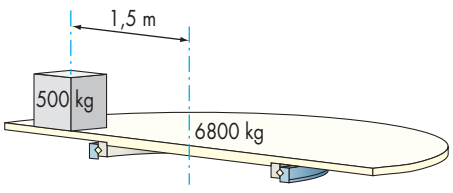
SLEWING TORQUE

The friction torque of standard slewing rings is defined in the following graph. ROLLIX, upon request, can supply slewing rings with lower or higher torque values.



APPLICATION EXAMPLE

Platform diameter : 4 m.
Platform mass : 6800 kg
Cube mass : 500 kg
Ball type slewing ring
raceway mean Ø : 2 m.
Distance from the cube to the
rotation axis : 1,5 m.
Initial speed : 2 RPM
Final speed : 6 RPM
Acceleration time : 20 sec.



LOADS APPLIED ON THE RING

Axial F_A : 68 kN + 5 kN = 73 kN
Radial F_R : 0,29 kN, negligible
Moment M_T : 5 kN x 1,5 m = 7,5 kNm

SLEWING TORQUE : Raceway mean Ø = 2 meters
Crv : according to the graph : 1 kNm

$$Crc = \left[\frac{13,11 \times 7,5}{2} + (73 \times 3) + (11,34 \times 0)\right] 2.10^{-3}$$

Crc = 0,536 kNm

Slewing torque at start up
Cd = 1 + 0,536 = 1,536 kNm

Platform moment of inertia :

$$\frac{MR^2}{2} = \frac{6800 \times 2^2}{2} = 13600 \text{ Kg m}^2$$

Cube moment of inertia :

$$Mr^2 = 500 \times 1,5^2 = 1125 \text{ Kg m}^2$$

Total moment of inertia :

$$13600 + 1125 = 14725 \text{ Kg m}^2$$

Acceleration torque :
n = 6 - 2 = 4 RPM

Acceleration time : 20 sec

$$Ca = \frac{14725 \times \pi \times 4}{30 \times 20} 10^{-3} = 0,3084 \text{ kNm}$$

Slewing torque during acceleration
Cg = 1 + 0,536 + 0,3084 = 1,845 kNm

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OTHER FEATURES

PROTECTION

SEALS

ROLLIX slewing rings are generally equipped with protecting seals on both sides of the raceway.
These seals have the function of :
• protecting raceways against small-sized contaminating agents,
• retaining the lubricant in the raceway.
For specific requirements, ROLLIX designs suitable protective devices, such as :
• standard and specific seals,
• lip seals
• combination of two or more seals.

SHROUDS

For severe application conditions and in order to limit the effects of aggressive agents such as :
• swarf and metal chips
• welding grains
• abrasives
• mud
• sand
• water and heavy sea splashes
• cutting fluids...

ROLLIX strongly recommends to install effective protective shields.
Furthermore, during cleaning with solvents or pressurised water, it is advisable to avoid working in the protective device area.

SURVEY

If, during regreasing, large grease discharges are noticed, it is advisable to check :
• that seal is still correctly positioned,
• that seal is not damaged (cut, torn, worn),
• that seals are still capable for proper bearing operation.
Therefore, this seal can either be reinstalled or replaced.

SEAL RANGE TABLE

Operating conditions	Ranges
"Normal" - 30° C à + 70° C	NITRILE-BASED elastomer
"Extreme" $\theta < -30°C$; $70°C < \theta < 200°C$	FLUOR-BASED elastomer
"Special" : Various physical or chemical aggressive agents.	NITRILE-BASED elastomer modified or others

PROTECTIVE SURFACE COATING

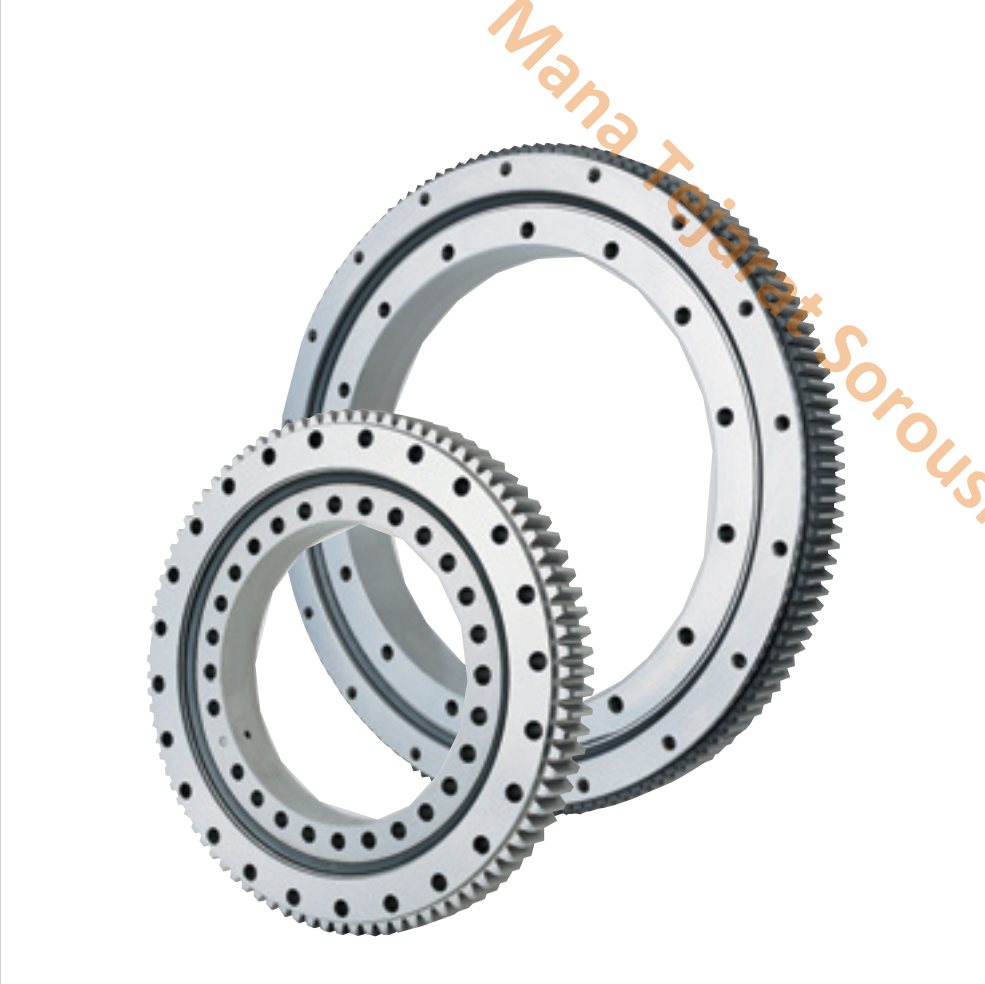
For particular applications, ROLLIX suggests a protective surface treatment, such as :

1. Zinc plating (+ chromate coating)
2. Phosphate coating
3. Chemical nickel plating
4. Paint
5. to 9 Miscellaneous treatments, for example, chrome plating, Schoop's metal spraying process, anodic oxidization, etc.

Consult us.

INSTALLATION AND MAINTENANCE

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- MOUNTING STRUCTURES
- INSTALLATION
- MARKING
- MAINTENANCE
- UTILIZATION LIMITS

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STRUCTURES

SUPPORT STRUCTURES

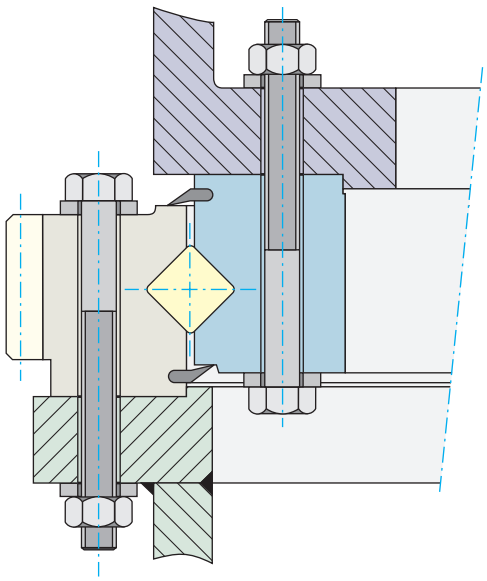
CHASSIS DESIGN

The slewing ring has a moderate axial stiffness : the diameter is large compared to the cross section. It must be mounted on a machined supporting base, ensuring sufficient stiffness with regard to the loads to be transmitted. This makes it possible to ensure an even distribution of stresses and to avoid any deformation during operation, which would be harmful to the good working of the ring.

Raceway mean diameter (mm)	500	750	1000	1250	1500	2000	2500	3000
Minimum thickness (mm)	25	30	35	40	50	60	70	80

Therefore, it is necessary to use supporting bases with a minimum thickness not less than the values indicated in the table above.
The width of the supporting surfaces is to be at least equal to that of the ring.

We recommend structural reinforcements in a circular frame placed directly beneath the raceway. For better loading uniformity, thick circular frames are preferred to thin reinforcements with ribs.



SHAPE TOLERANCES

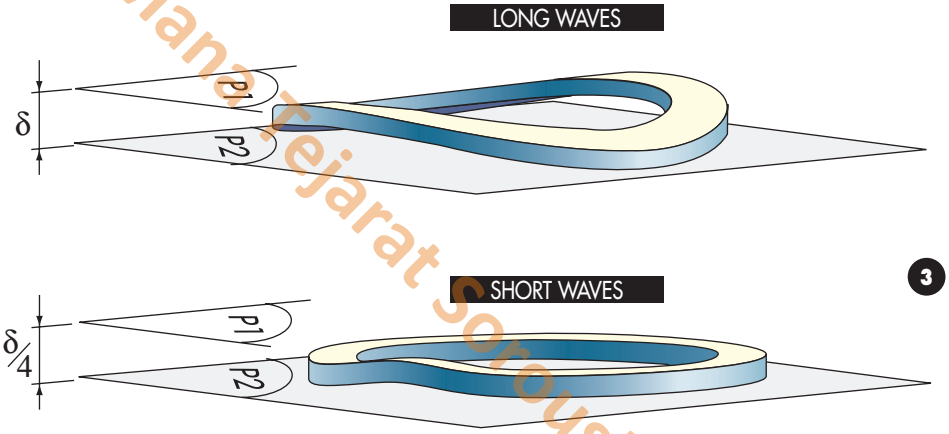
Shape defects of the supports lead to deformations of the raceway. This can cause tight spots or possible seizure and will reduce the bearing service life. The maximum flatness defects must not exceed the values of the opposite table.

Raceway mean diameter (mm)	500	750	1000	1250	1500	2000	2500	3000
Maximum tolerance Crossed Roller (mm)	0,10	0,12	0,15	0,18	0,20	0,25	0,29	0,32
Maximum tolerance Balls (mm)	0,12	0,18	0,21	0,25	0,28	0,33	0,38	0,42

STRUCTURES

SUPPORT STRUCTURES

These maximum values are allowable for "long waves" in the circumferential direction.
"Short waves" for example between two fastening holes, must not exceed 1/4 of the values in the opposite table.
Waves in the radial direction (conicity) must be less than 0,05 mm / m of raceway mean Ø.



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STIFFNESS TOLERANCES

The stiffness of the supporting frames must be such that deflections do not exceed the values of the opposite table under maximum load.

Raceway mean diameter (mm)	500	750	1000	1250	1500	2000	2500	3000
Maximum deflection (mm)	0,25	0,30	0,35	0,45	0,55	0,65	0,80	1,00

PLASTIC CEMENTS

If the above tolerances could not be met, then Epoxy-type resins can be used instead of finish-machining of the surfaces.

Several products are possible depending on the dimensions and the amount of out of flatness to be compensated. Detailed instructions are available from our Sales Department.

INSTALLATION

TRANSPORT - HANDLING

Our slewing rings are carefully packed in order to avoid any damage during transport.
Transport and storage are to be carried out in horizontal position only ; transport in other positions requires special methods.
As with any mechanical precision part, the rings must be handled with care avoiding any shocks, particularly along the radial axis.
Handling should be carried out with suitable equipment for the weight of the part, which is indicated on the identification tag.

DELIVERY - STORAGE

The packed rings have an anticorrosive surface protection allowing a 6-month-storage in a covered and temperate room.
A suitable protection must be applied for longer storage.
It is necessary to regrease after each 18-month-period *(see paragraph MAINTENANCE - LUBRICATION).*

UNPACKING - PREPARATION

When unwrapping the bearing :
• Take care not to cut the protective seals when removing the packing paper.
• Cut this paper, preferably on the external diameter, and not on the upper or lower faces.

When degreasing the bearing :
• Use a standard commercially available solvent. **Chlorine containing solvents are prohibited**.
• Take care not to introduce any solvent under the seals or in the raceways.
• Before fitting the grease nipples or junction pipes, remove the plastic caps or the Hc screws from the greasing holes.

INSTALLATION

WHEN INSTALLING THE BEARING :

Structure

• Make sure that supporting structures comply with specifications *(see chapter STRUCTURES).*
• Check for chips, weld seam particles, corrosion signs, etc.
• Check the good mating of the rings on the supports.

SPIGOTS

When loads along the radial axis are important, especially when the bearing is placed vertically, it is then mandatory to use the centerings provided for that purpose.
The intercalative structural adhesive type LOCTITE 586 provides a good means to limit the relative displace-ments between rings and supports.
See our technical instructions IT ETR 521, available upon request.

POSITIONING

The hardening junction which is marked by a red line on the geared ring, and located at the filler plug on the other ring, must be placed **at 90° to the main load axis** or to the arm supporting the load *(see chapter MARKING).*

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INSTALLATION

INSTALLATION

Fastening

• Check that fasteners are really of the recommended grade, e.g. marked 10.9 on the head and that threads are properly lubricated.
• For bearings in normalized steel Z or N, the use of treated hardened flat washers is required as follows :
• the yield strength is greater than or equal to 600 Mpa,
• the diameter D_R = 2 d,
• the thickness h ≥ 0,3 d.
The elastic washers type Belleville, Grower or others of whatever type or pattern are absolutely prohibited and will void all warranty.
• Install all fasteners and tighten lightly.
• Then tighten to the specified value using a properly calibrated torque wrench ; hydraulic devices are advisable.
• Use a "star shape" pattern when torquing which ensures a uniform tightening over the whole periphery.
The tightening torque to be applied is defined in the following table for bolt grade 10.9 and a screw/nut friction factor of 0,12 according to VDI 2230.

WHEN INSTALLING THE PINION :

Gear

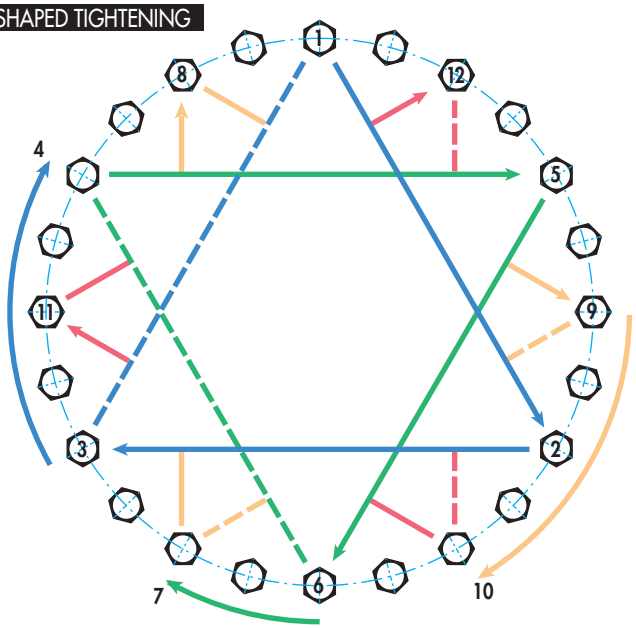
• The pinion should be located approximately at 90° of the major loading axis.
• Adjust the driving pinion to the maximum eccentric point of the ring gear, marked by a blue line.
• At this stage, the backlash must be within the limits of the calculated values or minimum at 0,05 x module.
• When several pinions are used, each one must be adjusted to the same conditions.
• During tests, make sure that good alignment of the pinion and of the slewing ring axes permits a satisfactory contact across all the gear width.
• Before running, lubricate the teeth of the slewing ring gear and of the pinion *(see chapter MAINTENANCE).*

3

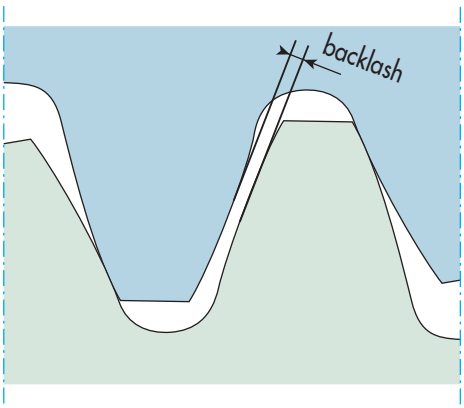
TIGHTENING TORQUE

Diameter (mm)	10	12	14	16	18	20	22	24	27	30	33
Torque (N.m)	69	117	185	280	390	560	750	960	1400	1900	2600

STAR-SHAPED TIGHTENING



Checking the gear backlash



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INSTALLATION

INSTALLATION

Tests - inspections

After final tightening of all fasteners :

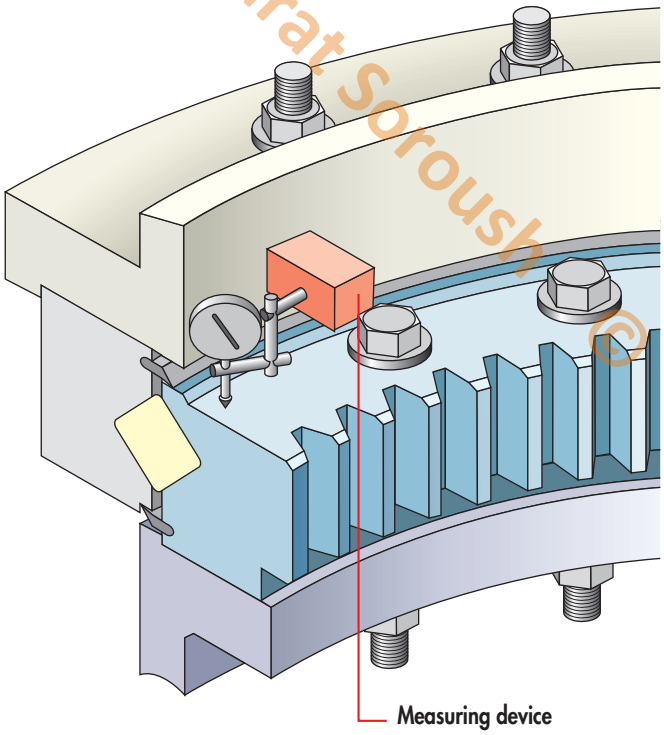
- Rotate the ring for at least 3 turns.
- Recheck the backlash value on the gear mesh over one full revolution.
- Measure the total deflection under a known load. The checked points should be marked.

It is advisable to register these values in a maintenance logbook specific to the machine, see our *"COMMISSIONNING DOCUMENTS" ref. IT-DTR.19.005.*

Operating process :

- Place a measuring device between the two rings as close as possible to the raceway on the main load axis : precision grade 0,1 mm minimum.
- Calibrate to zero, under a known load.
- Apply a measured load.
- Read the deflection value at the point considered.
- Repeat this measurement in the previously marked points.
- Take into account the deflection of the support chassis and the fasteners elongation corresponding to the instrument position.

DEFLECTION MEASUREMENT UNDER LOAD ON MOUNTED SLEWING RING



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MARKING

IDENTIFICATION TAG

Each ring is individually identified by a metallic tag riveted close to the filler plug on the ungeared ring.

This tag states :

- **manufacturing date,**
- **part number of the ring,**
- **its serial number,**
- **its weight in kilograms.**



INSTALLATION MARKS

In order to permit the correct installation of the bearing, ROLLIX slewing rings are marked as follows :

Hardening junction :

- Located on the filler **plug** for the ungeared ring.
- Marked by a **red line** on the gear face for the geared ring.

These areas must be placed as close as possible to the neutral axis of the loads : ideally at zero moment axis.



Gear run-out :

The maximum point of the gear run-out is marked by :

- **Two blue lines** on the corresponding tips of the teeth,
- a **O** stamped on the face opposite the mounting surface.

The backlash of the driving pinion must be adjusted at this point.

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MAINTENANCE

MAINTENANCE - LUBRICATION

A suitable lubrication is essential for the longevity of the raceways and gears. The operating conditions such as loads, temperatures, speeds, vibrations, etc... determine the choice of lubricant.

RACEWAY

Unless otherwise specified, the slewing rings are delivered greased.
Standard grease : ESSO BEACON EP 2 or equivalent.

Main properties required for multi-purpose grease :
As being a significant component of the bearing, grease will improve the bearing capabilities and longevity.

Recommendations for bearing lubricant :

- Lithium-base soap.
- Minimum viscosity of the base : 150 mm^2/sec.
- Grade NLGI 2.
- Anti-wear and extreme pressure additives.
- Service temperature : – 30° C to + 120° C
- 4 ball test : weld load : ASTM D 2596 (NT24) > 300
- Maximum ND_M :

for balls ≃ 60 000
for rollers ≃ 30 000

GEAR

A protection against oxidation is applied.

GREASING HOLES

Radially or facially located, depending on design, these holes are generally tapped M10 x pitch . 1.00 and closed by plastic caps or Hc screws.
Remove these plugs before fitting the slewing ring with grease nipples or linked to a centralized lubrication system.
Caution : the filler plug for the rolling elements has a blind tapped hole which is not a greasing hole.

REGREASING METHODS

Whenever the application allows it, greasing must be carried out during rotation at slow speed, on two revolutions minimum, through all the greasing holes.

GREASING FREQUENCY

Raceway and gear.
The greasing frequency varies according to utilization and environ-ment. We recommend regreasing every 150 hours in normal usage. This frequency is to be reduced to 50 hours when the conditions of application are severe or if the environment is dusty or wet.
Greasing is required, before and after a long idle period.
Regrease every 6 months, while rotating, during prolonged idle periods.

GREASE QUANTITY

Raceway :
The grease quantity is defined by the Engineering Department whenever a detailed bearing calculation is provided.
Approximate practical formula to determine the minimum necessary quantity "Q" in cm^3 :
Q = 0,005/3 x D x H with :
D = raceway mean Ø of the bearing in mm.
H = overall height of the ring in mm.
In all cases, a light extrusion of new grease must appear at the protection seal lips.

Gear :

The grease must entirely cover the flanks of the pinion and of the ring gear whether applying by brush or spraying.

SPECIFIC APPLICATIONS

Upon request, the ROLLIX Engineering Department will provide solutions for extreme conditions : temperature, speed, etc.
See our data sheet IT ETR 551.

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MAINTENANCE

MAINTENANCE - LUBRICATION

CORRESPONDENCE TABLE

According to our experience, the greases mentioned in the opposite table are compatible with each other and with the components of the bearings.
It is possible to use other lubricants provided that you are sure of their compatibility with the ROLLIX standard recommendation beforehand.
Greases containing molybdenum disulphide MoS_2 are strictly forbidden.

BEARING	GREASE BRAND	GEAR
Aralub HLP2	**ARAL**	Aralub LFZ1
Rhus L 474/2	**MOTUL/BECHEM**	Berulit GA 400
Energrease LS - EP2	**BP**	Energol WRL/GR 154 GS
Grease LMX	**CASTROL**	
Epexa 2 / Epexelf 2	**ELF**	Cardrexa DC1
Beacon EP2	**ESSO**	Surret Fluid NX
Mobilux EP2	**MOBIL**	Mobilgear OGL 007
Retina EP2 - Alvania EPLF2	**SHELL**	Malléus GL 205
Multis EP2 - Lical EP2	**TOTAL FINA ELF**	Ceran AD

This table is subject to change in accordance with the manufacturers'research works.

PREVENTIVE MAINTENANCE

PROTECTION SURVEY

A visual examination makes it possible to ensure the integrity of the protective seals :
- absence of excessive stretch or rips,
- correct positioning,
- wear of the friction lip.

If necessary, replace the seal.
After regreasing, wipe clean residue of old grease and check for pollutants such as sand, coal, metallic particles, etc.

FASTENER SURVEY

It is particularly important to check that the required preload level of the bolts is still maintained as the fasteners of the slewing rings are essentially working in fatigue.

ROLLIX recommends to retighten the fasteners after the first two to four months of utilization and then proceed to a systematic yearly check.
If any bolt is found loose, a further in deep examination is essential. The necessary preservative measures must then be exercised.
Some regulations impose the replace-ment of fasteners every seven years or every 14 000 working hours.
In any case, refer to local rules and regulations enforced connected with the application.

ORIENTATION SURVEY

During cleaning prior to regreasing of the gear :
- Check carefully for any foreign body at the tooth root, ring and pinion.
- Check the even load distribution of the pinion on the entire width of the ring gear and correct the alignment of the axes if needed.
- Check the backlash value.

UTILIZATION LIMITS

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CHECKING THE DEFLECTION UNDER LOAD

ROLLIX delivers its bearings with a preload ensuring proper functioning and optimum safety. During the product life, the preload decreases resulting in a noticeable increase of deflection under load. The bearing must be replaced when the deflection becomes incompatible with the proper functioning of the machine and with the required safety conditions for the type of material used.

ROTATION SURVEY

To quantify the wear factor, it is necessary to know the deflection under load.

- In new condition : J_0
- At time of survey : J_1

These measurements are made under the same initial conditions after having checked the tightening of fasteners *(see chapter INSTALLATION, Tests - Inspection, page 46).*

It is most advisable to register the measured values in the maintenance logbook specific to the machine.

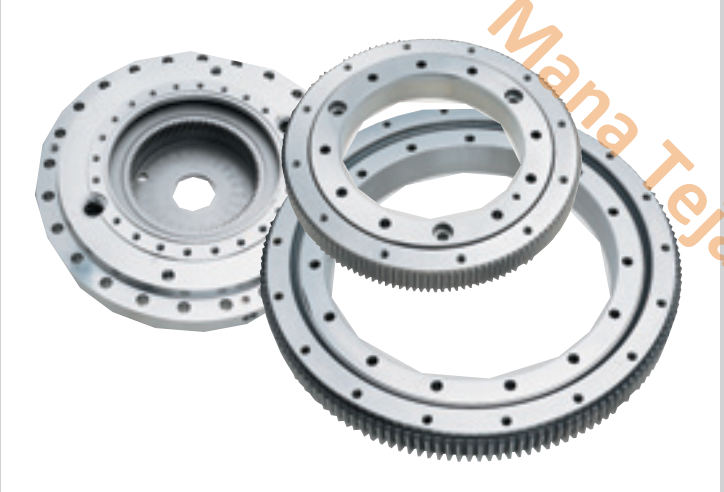
Wear is the difference : $u = J_1 - J_0$.

- The bearing must be placed under survey when : $u \geq J_0$.
- Its replacement must be considered when : $u \geq 1{,}5\ J_0$.

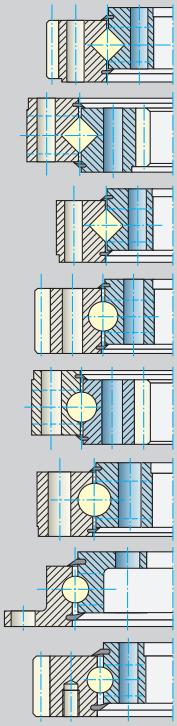
and it is required when : $u \geq 2\ J_0$.

In any case, refer to laws and regulations in force pertaining to the application in the concerned country.

RANGE OF PRODUCTS



- CODING SYSTEM
- BEARING FAMILIES
- DRAWINGS
- CAPACITY CURVES
- BEARING REFERENCES



- CROSSED ROLLERS External Gear 06
- CROSSED ROLLERS Internal Gear 07
- CROSSED ROLLERS Without Gear 08
- BALLS External Gear 01
- BALLS Internal Gear 02
- BALLS Without Gear 03
- LIGHT SERIES 21 to 29
- LIGHT SERIES SOLID SECTIONS 31 to 39

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CODING SYSTEM

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ROLLIX bearings are designated by a part reference including numbers and letters, according to the opposite codes.

GEOMETRY	METALLURGY
06 1116 00	Z Z 1 2 A

06 1116 00 Z Z 1 2 A — **Family**

06 **1116** 00 Z Z 1 2 A — **Mean raceway ball/roller pitch Ø**

06 1116 **00** Z Z 1 2 A — **Variation N° in the family**

06 1116 00 **Z** Z 1 2 A — **Material code letter ungeared ring**

06 1116 00 Z **Z** 1 2 A — **Material code letter geared ring**

Material code :

- **Z** Improved XC45 (or similar)
- **X** XC45 core hardened
- **N** 42CrMo4 normalized
- **D** 42CrMo4 core hardened
- **K** aluminium alloys
- **J** other materials

06 1116 00 Z Z **1** 2 A — **Gear treatment :**

- **0** gear without heat treatment
- **1** gear with contour hardening on flanks and roots
- **2** gear flanks superficially hardened
- **3** other hardening treatments

06 1116 00 Z Z 1 **2** A — **Surface coating :**

- **0** oil storage protection
- **1** zinc or cadmium plated + chromate coating
- **2** phosphate coating
- **3** chemical nickel plating
- **4** paint : **40** ROLLIX standard primer
  41 to **49** specific paint systems
- **5** to **9** miscellaneous treatments (6 = anodic oxidization)

06 1116 00 Z Z 1 2 **A** — **Revision index :** Project drawings : revisions according to numerical index from **1** to **9**

Manufacturing drawings : first production = index **A**

subsequent revisions = index **B** to **Z**

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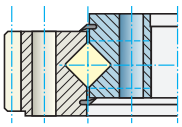
BEARING FAMILIES

CROSSED ROLLERS STANDARD		BALLS STANDARD		LIGHT SERIES			SOLID SECTIONS			GEAR		
Class V		Class III & V		Class I III V			Class I III V			Ext.	Int.	Without
Single row	Double row	Single row	Double row	Normal clearance	Reduced clearance	Precision	Normal clearance	Reduced clearance	Precision			
06	16	01	11	21	24	27	31	34	37	●		
07	17	02	12	22	25	28	32	35	38		●	
08	18	03	13	23	26	29	33	36	39			●

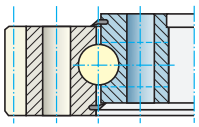
DEFINITION OF CLASSES

Classes I, III and V define the amount of internal preload of the bearing. Class V corresponds to the maximal preload.
This table shows the main families of ROLLIX slewing rings. Slewing rings of specific types are listed in the document IT ETR 002.

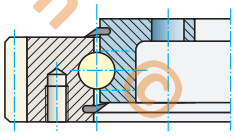
FAMILY 06



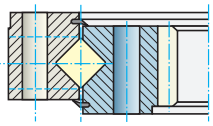
FAMILY 01



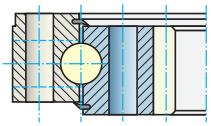
FAMILY 21 - 24 - 27



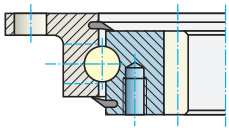
FAMILY 07



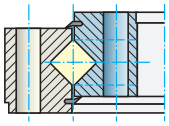
FAMILY 02



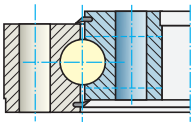
FAMILY 22 - 25 - 28



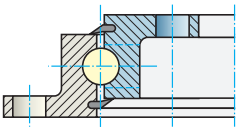
FAMILY 08



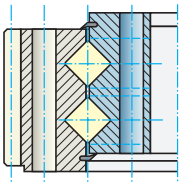
FAMILY 03



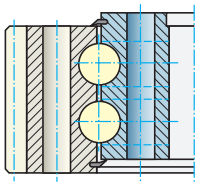
FAMILY 23 - 26 - 29



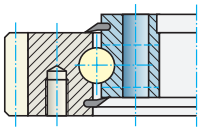
FAMILY 16



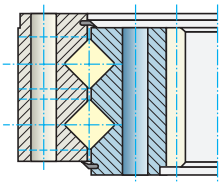
FAMILY 11



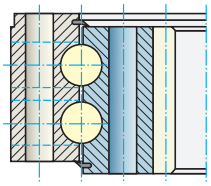
FAMILY 31 - 34 - 37



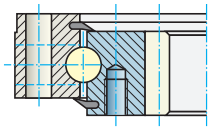
FAMILY 17



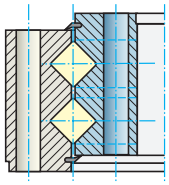
FAMILY 12



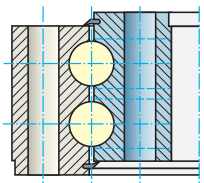
FAMILY 32 - 35 - 38



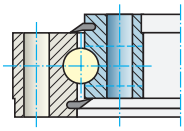
FAMILY 18



FAMILY 13



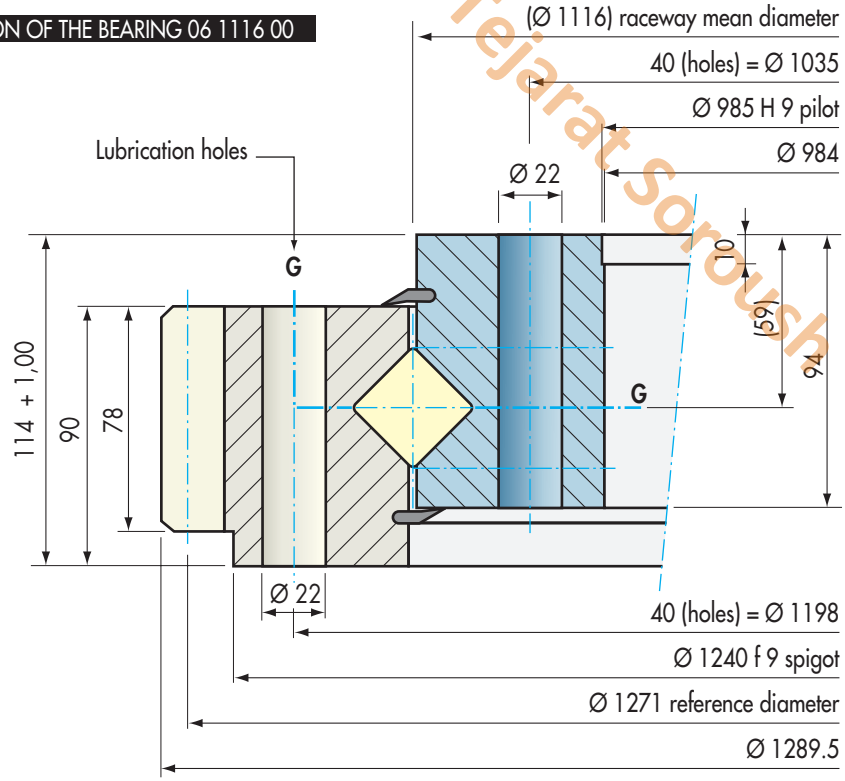
FAMILY 33 - 36 - 39



DRAWINGS

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CROSS SECTION OF THE BEARING 06 1116 00



Each bearing is designated by a drawing reference, example : 06 1116 00.

The drawing defines both principal and functional dimensions : spigots, bolt patterns and dimensions, overall height, reference diameter of the gear.

Fastening :
the drawing indicates :

- **40 : number of** fastening **holes**,
- **"="** symbolizes **equispaced holes**,
- **"#"** indicates **non equispaced holes**,
- **1035 :** bolt circle diameter.

The symbol **"G"** indicates the arrangement of the lubrication holes, the standard tapping is : M 10 x 1,00 except for the light series and the solid section light series : M 8 x 1,00.

The raceway mean diameter of the bearing is given for information only.

The gap diameters cannot be used as spigots, except when their dimensions are toleranced on the drawing.

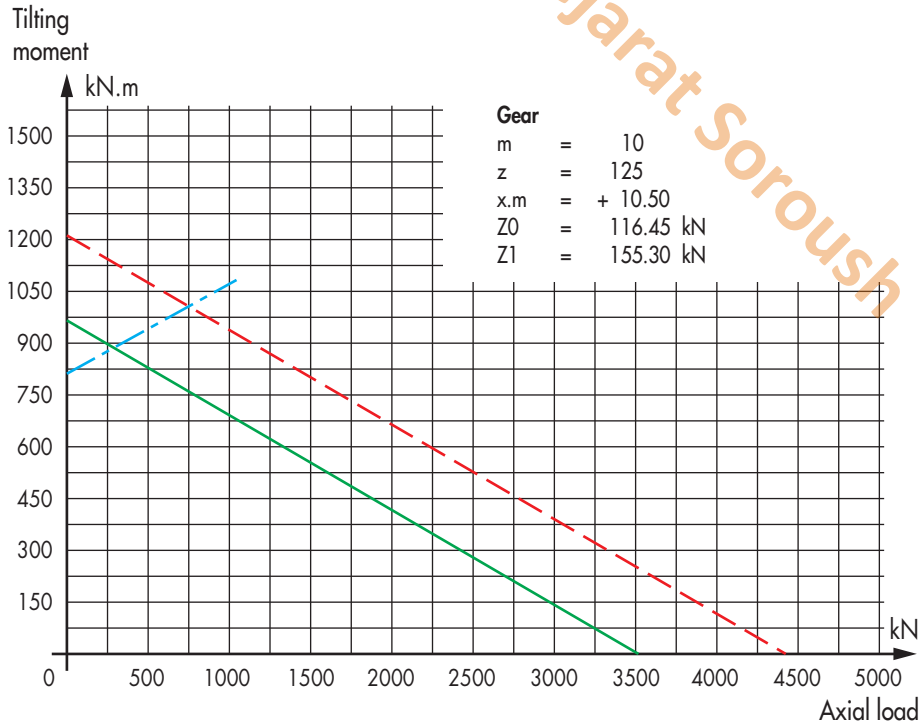
This document is not contractual, the latest issue of the drawing is available upon request.

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CAPACITY CURVES

A rating graph illustrating the various load capacities is associated with each bearing reference. This "capacity curve" shows the same reference number as the bearing. The steel specification which is used is indicated by the code letter.

CURVES OF BEARING 06 1116 00



This dotted line symbolizes the maximum dynamic capacity of the bearing. The functional point revised with the application and utilization factors must never exceed **this limit under maximum loading.**

This solid line represents a utilization limit curve for a minimum application factor of 1,25.

This dot-dash line indicates the bolting limit capacity for a supported load using bolts grade 10.9.

• The functional point revised by utilization factors must never exceed this limit in **normal operation**.

• The **title block** indicates the main characteristics of the gear : m, z, xm, and the ultimate resistance to fatigue bending stress according to the gear ring material and heat treatment indicated by a material code letter.

m = module : 10
z = number of teeth : 125
x.m = addendum modification (radius) : + 10.50
Z0 = Z : material
0 : gear without treatment
Z1 = Z : material
1 : gear without contour hardening.

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BEARING REFERENCES

BEARINGS WITH EXTERNAL GEAR - Classification according to external diameter

External diameter	Internal diameter	Height	Weight	Module	Number of teeth	Bearing reference	Page	Quality STD = STANDARD SF = THIN SERIES
244	125	25	5	2	120	01 0181 02	75	STD
318	169	45	14	3	104	01 0235 00	75	STD
379	210	45	20	4	92	01 0289 06	75	STD
403,5	234	55	25	4,5	88	06 0307 00	59	STD
440	265	50	28	4,5	95	01 0342 00	76	STD
529	323	54	45	5	103	01 0422 01	76	STD
535	305	75	61	8	65	06 0400 00	59	STD
589	383	75	62	5	116	06 0475 22	59	STD
654	390	85	98	8	80	06 0508 00	60	STD
689	455	74	89	6	112	01 0555 01	76	STD
700	479	77	85	6	114	06 0574 09	60	STD
774	516	82	118	8	94	01 0626 00	77	STD
816	573	90	129	6	132	06 0675 00	60	STD
863	679	82	102	6	142	01 0765 01	77	STD
886	610	85	155	8	108	06 0734 00	61	STD
979	717	100	178	10	94	06 0823 18	61	STD
1022	770	82	159	8	125	01 0880 00	77	STD
1094	833	82	179	8	134	01 0947 00	78	STD
1144	869	100	228	10	111	06 0980 09	61	STD
1218	930	98	268	10	119	01 1050 00	78	STD
1289,5	984	114	330	10	125	06 1116 00	62	STD
1358	1045	98	325	10	133	01 1180 00	78	STD
1431	1200	63	176	8	177	01 1295 01	79	SF
1476	1084	110	503	10	144	06 1250 21	62	STD
1604	1206	130	653	10	157	06 1390 03	62	STD
1605	1270	110	469	12	131	01 1410 00	79	STD
1727	1500	63	213	8	214	01 1595 00	79	SF
1836	1433	135	791	16	112	06 1595 04	63	STD
1929	1565	110	617	14	135	01 1712 00	80	STD
1975	1750	63	244	8	245	01 1845 02	80	SF
2027	1615	150	1004	14	142	06 1790 09	63	STD
2140	1720	130	953	16	131	01 1895 00	80	STD
2165	1950	68	278	8	269	01 2040 03	81	SF
2267	1815	140	1174	16	139	06 2002 00	63	STD
2342	2091	70	373	8	290	01 2202 00	81	SF
2390	1950	130	1111	18	130	01 2130 00	81	STD
2534	2042	144	1482	18	138	06 2242 00	64	STD
2695	2425	63	411	8	335	01 2560 01	82	SF
2790	2290	164	1895	18	151	06 2500 01	64	STD
3116	2600	164	2200	20	152	06 2810 09	64	STD
3200	2914	90	716	10	318	01 3031 00	82	SF

BEARING REFERENCES

BEARINGS WITH INTERNAL GEAR - Classification according to external diameter

External diameter	Internal diameter	Height	Weight	Module	Number of teeth	Bearing reference	Page	Quality STD = STANDARD SF = THIN SERIES
300	174,5	40	10	3	60	02 0245 00	83	STD
385	217	55	24	4	56	02 0308 01	83	STD
451	291	55	28	5	60	07 0380 01	65	STD
515	316	54	44	5	64	02 0422 00	83	STD
562	385	60	44	6	66	07 0489 11	65	STD
610	403	68	63	6	68	02 0520 00	84	STD
665	457	60	61	6	77	07 0573 00	65	STD
740	493	76	105	6	83	02 0626 01	84	STD
771	541	70	96	6	91	07 0673 00	66	STD
835	578	82	130	8	73	02 0720 02	84	STD
871	634	70	113	8	80	07 0770 00	66	STD
935	674	82	150	8	85	02 0820 00	85	STD
960	706	75	144	8	89	07 0849 00	66	STD
975	784	82	120	8	100	07 0885 01	67	STD
1050	794	82	168	8	100	02 0935 00	85	STD
1066	785	85	190	10	79	07 0946 05	67	STD
1170	882	98	258	10	89	02 1050 00	85	STD
1175	961	90	179	10	98	07 1075 01	67	STD
1251	979	91	238	10	99	07 1140 13	68	STD
1360	1052	98	321	10	106	02 1225 00	86	STD
1390	1162	63	171	8	146	02 1295 00	86	SF
1431	1143	97	323	10	115	07 1304 04	68	STD
1530	1178	130	541	12	100	07 1385 03	68	STD
1560	1215	110	471	12	102	02 1415 00	86	STD
1676	1422	78	278	10	144	02 1565 02	87	SF
1770	1375	150	802	14	100	07 1606 02	69	STD
1870	1501	110	607	14	108	02 1715 00	87	STD
1916	1662	78	324	10	168	02 1805 02	87	SF
2002	1595	150	951	14	115	07 1830 04	69	STD
2130	1906	68	290	8	239	02 2040 00	88	SF
2190	1731	144	1199	16	109	07 1997 04	69	STD
2195	1780	130	979	16	112	02 2022 00	88	STD
2298	2066	70	343	8	259	02 2202 00	88	SF
2590	2110	160	1626	18	118	07 2400 00	70	STD
2695	2426	63	414	8	304	02 2560 00	89	SF
2785	2362	130	1270	18	132	02 2618 00	89	STD
3020	2495	158	2154	20	126	07 2810 09	70	STD
3190	2914	90	735	8	366	02 3074 01	89	SF

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BEARING REFERENCES

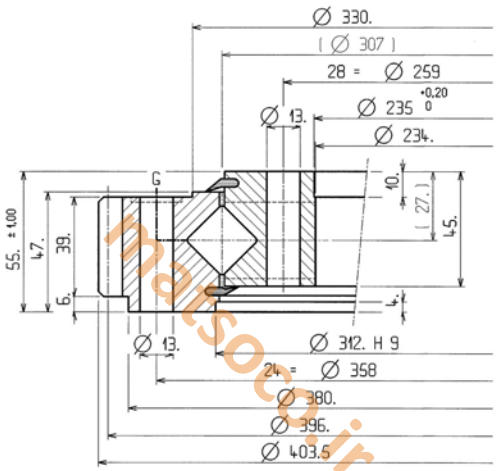
BEARINGS WITHOUT GEAR - Classification according to external diameter

External diameter	Internal diameter	Height	Weight	Bearing reference	Page	Quality STD = STANDARD
234	125	25	5	03 0181 07	90	STD
290	150	41,5	14	03 0217 00	90	STD
300	140	52	16	08 0220 05	71	STD
329	190	45	17	03 0260 00	90	STD
350	190	52	20	08 0270 04	71	STD
403,5	234	55	26	08 0307 00	71	STD
440	240	60	37	08 0340 04	72	STD
440	265	50	29	03 0342 05	91	STD
455	265	71	45	03 0360 00	91	STD
474	336	46	24	08 0405 05	72	STD
475	335	45	30	03 0402 00	91	STD
500	305	75	51	08 0400 00	72	STD
589	383	75	66	08 0475 08	73	STD
626	424	72	70	03 0525 01	92	STD
700	479	77	90	08 0574 08	73	STD
712	487	72	91	03 0600 02	92	STD
816	573	90	137	08 0675 00	73	STD
900	670	86	148	03 0785 00	92	STD
979	717	100	193	08 0823 08	74	STD
1130	845	100	271	03 0980 02	93	STD
1144	869	100	248	08 0980 06	74	STD

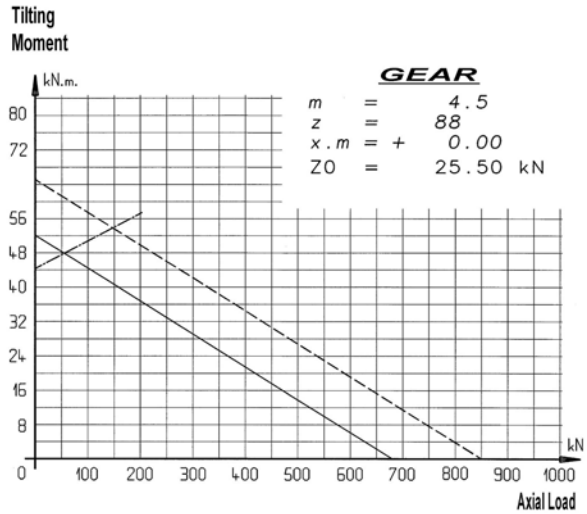
The following pages show you a selection of our range of standard bearings.
These bearings are manufactured on a regular schedule.
Consult our Sales Department about their availability.

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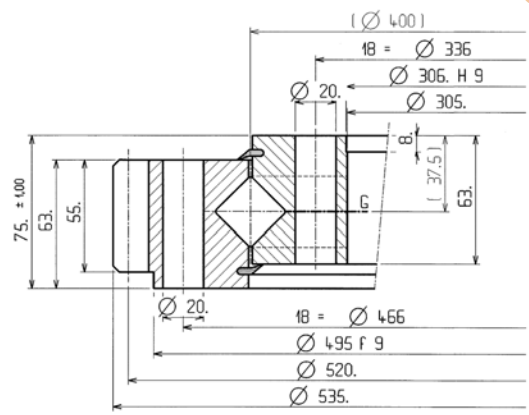
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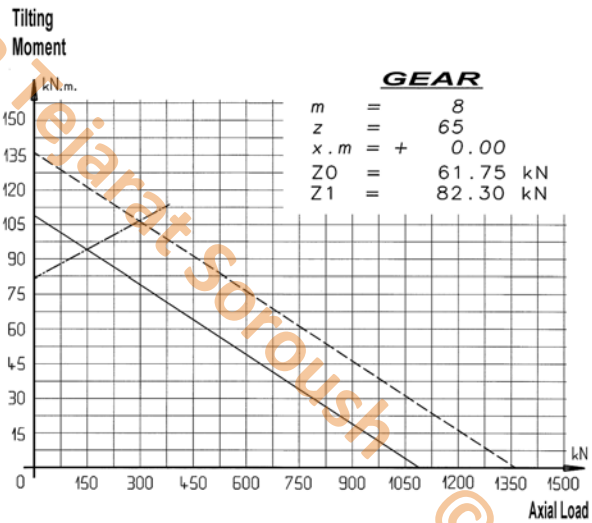
Estimated Weight : 25. kg



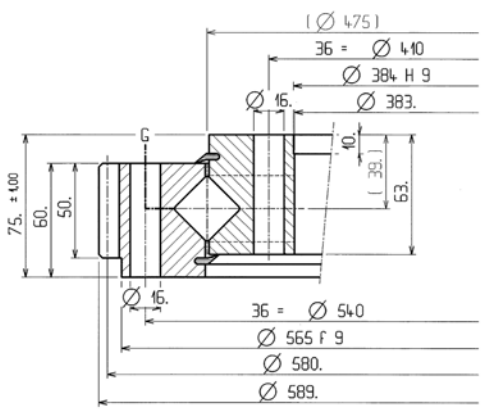
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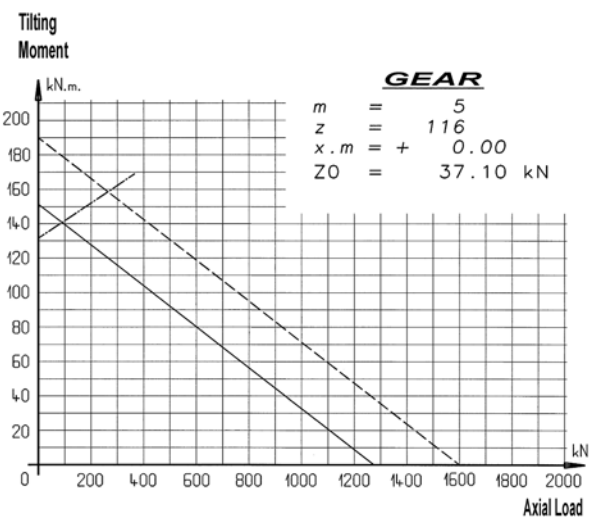
Estimated Weight : 61. kg



06.0475.22



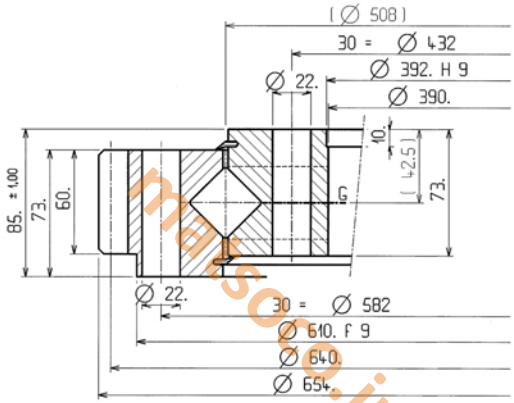
Estimated Weight : 62. kg

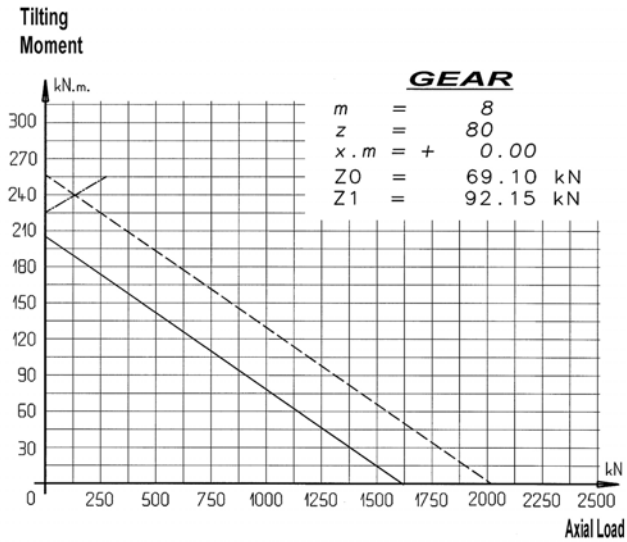


REFER TO PAGES 54 AND 55 FOR THE INTERPRETATION OF DRAWINGS AND CURVES

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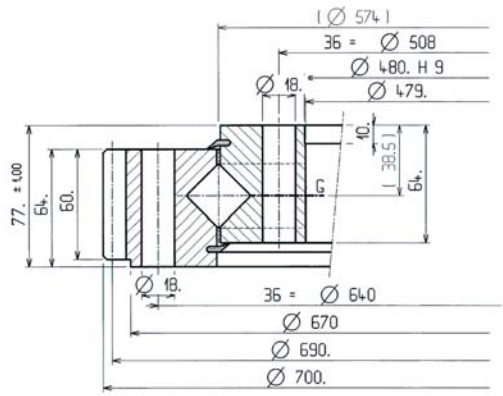
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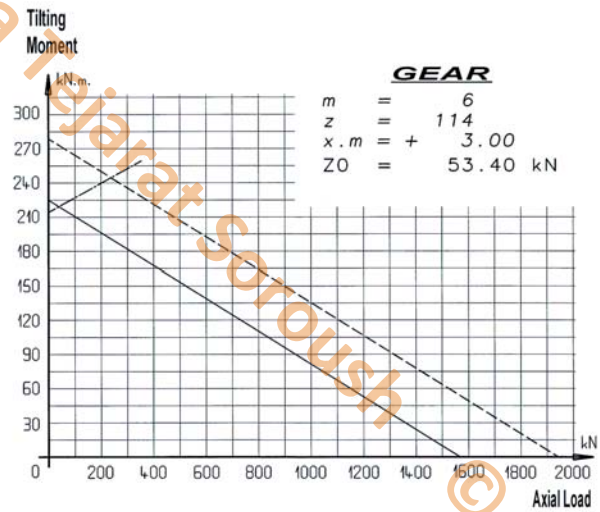




Estimated Weight : 98. kg

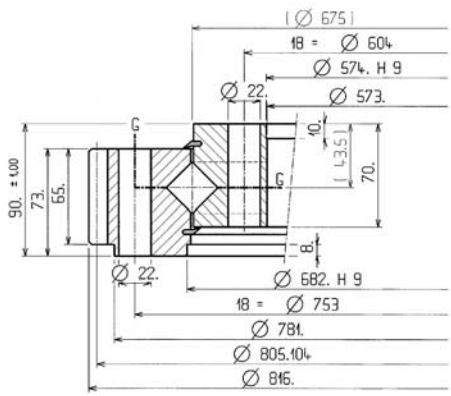
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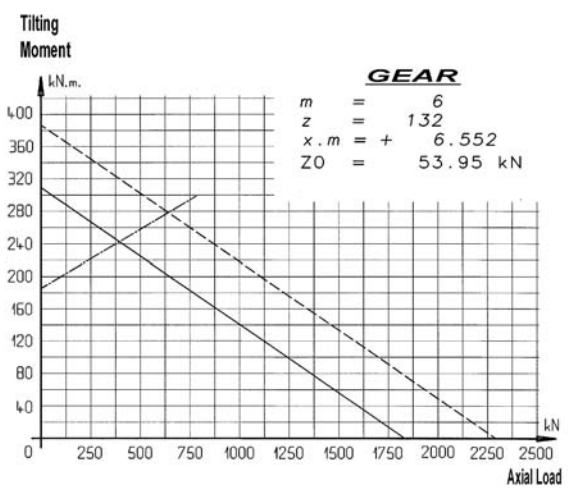




Estimated Weight : 85. kg

06.0675.00



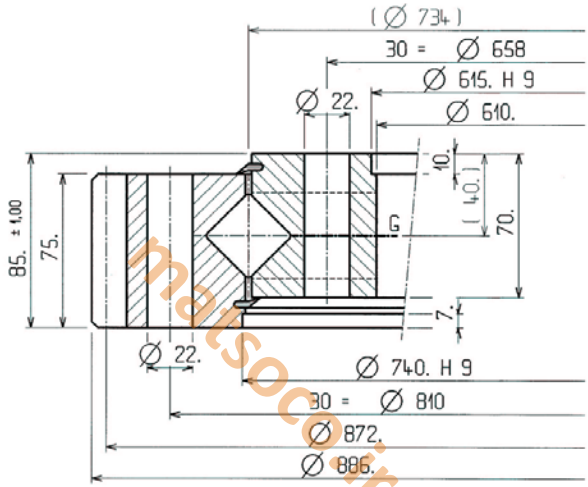


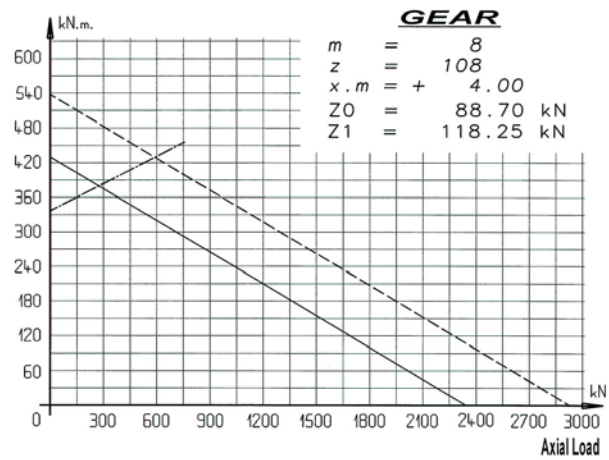
Estimated Weight : 129. kg

REFER TO PAGES 54 AND 55 FOR THE INTERPRETATION OF DRAWINGS AND CURVES

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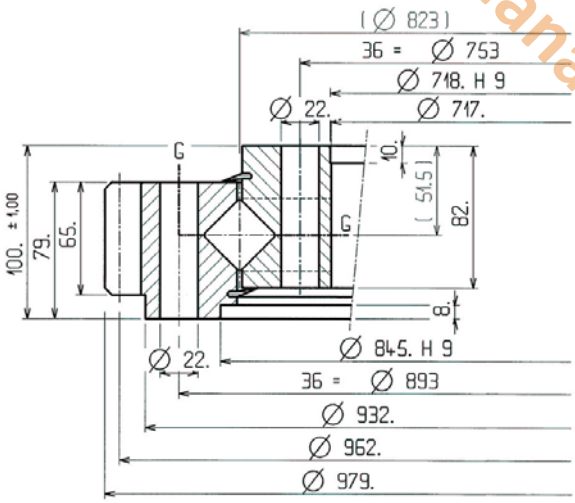
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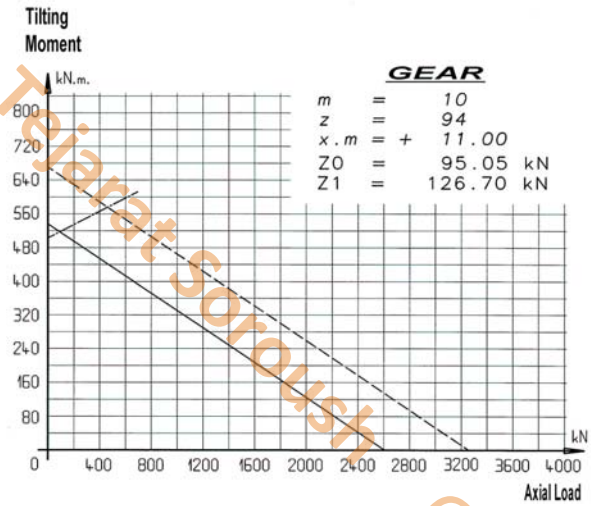




Estimated weight: 154 kg

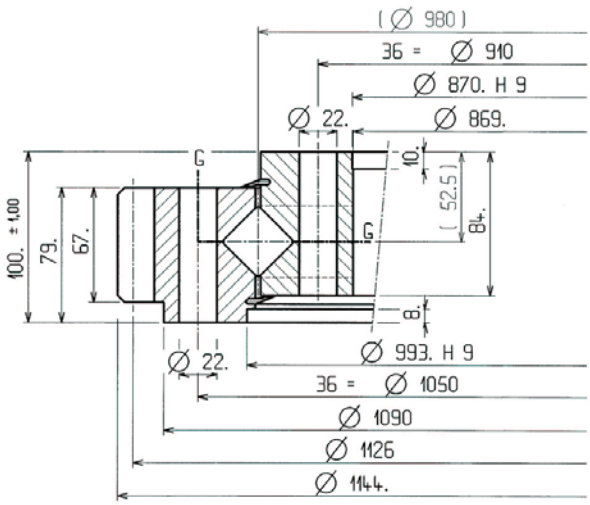
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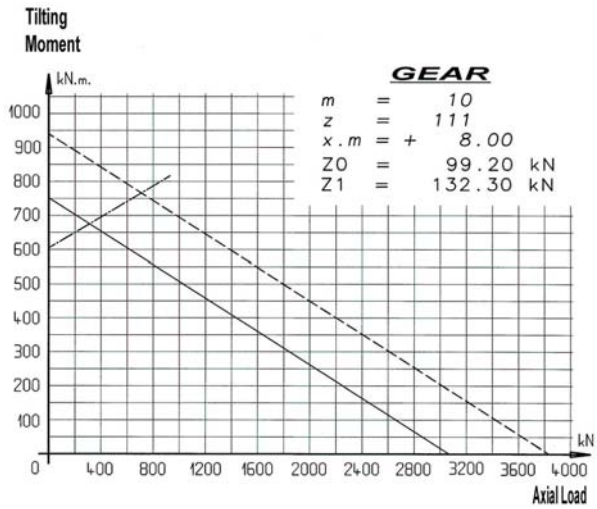




Estimated Weight: 178 kg

06.0980.09



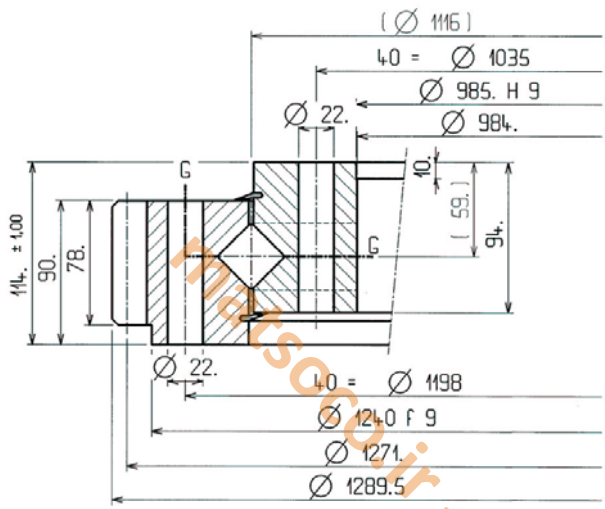


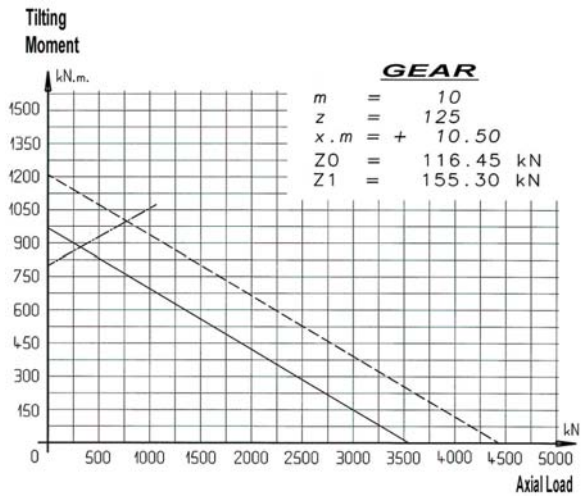
Estimated Weight: 228 kg

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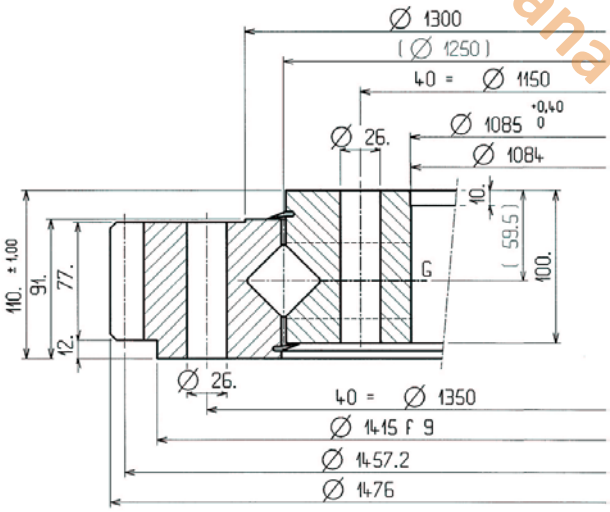
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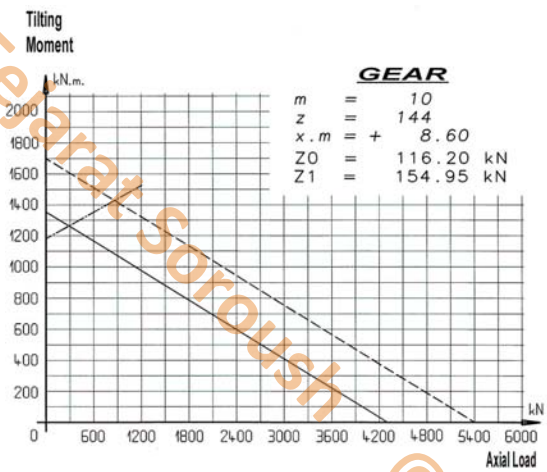




Estimated Weight: 330 kg

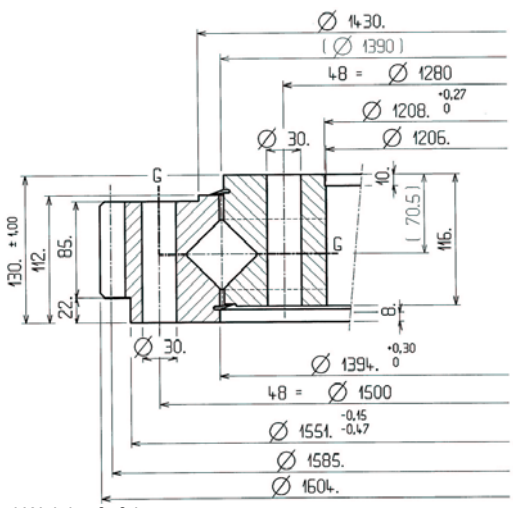
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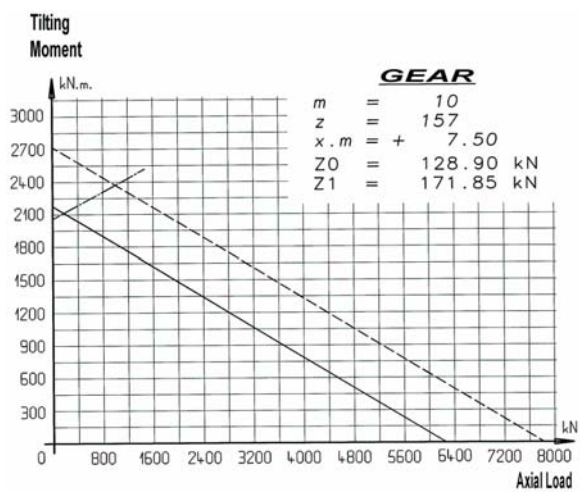




Estimated Weight: 503 kg

06.1390.03



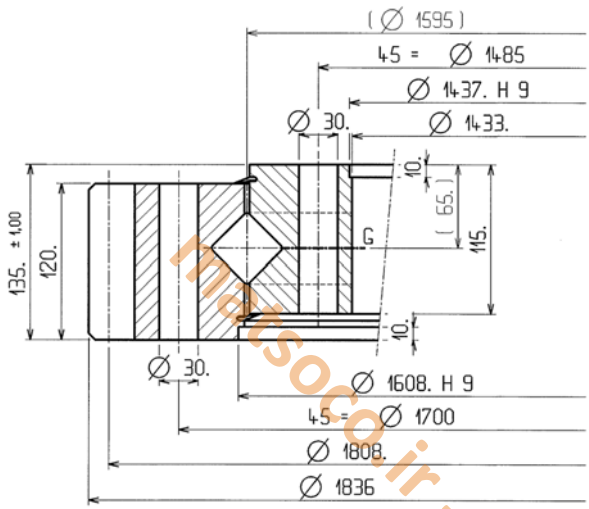


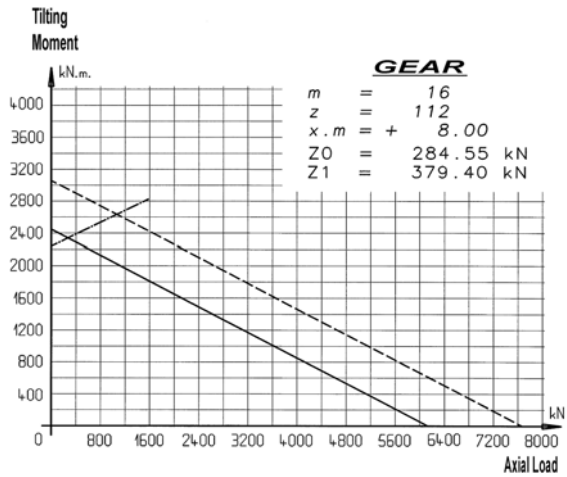
Estimated Weight: 653 kg

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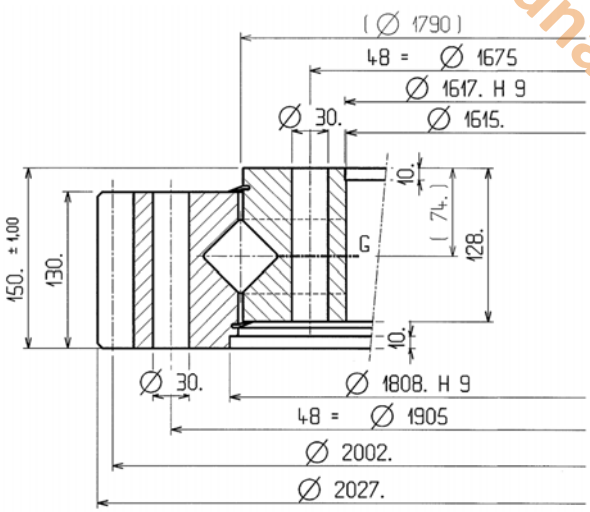
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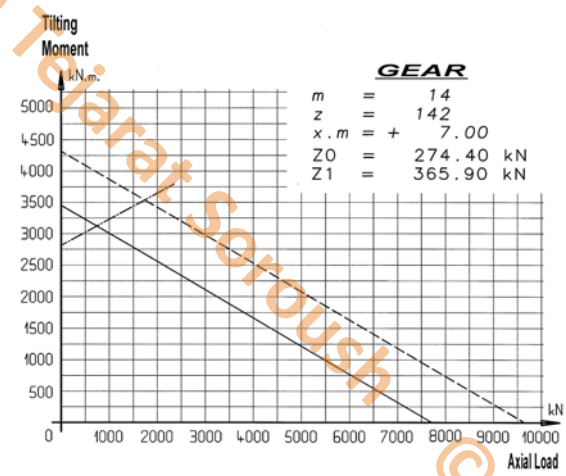




Estimated Weight: 791 kg

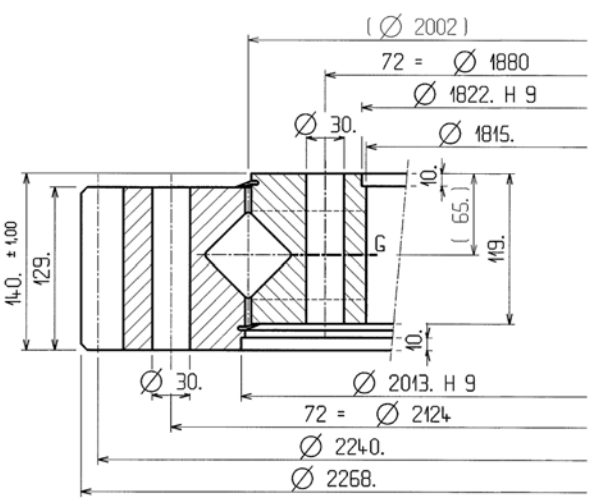
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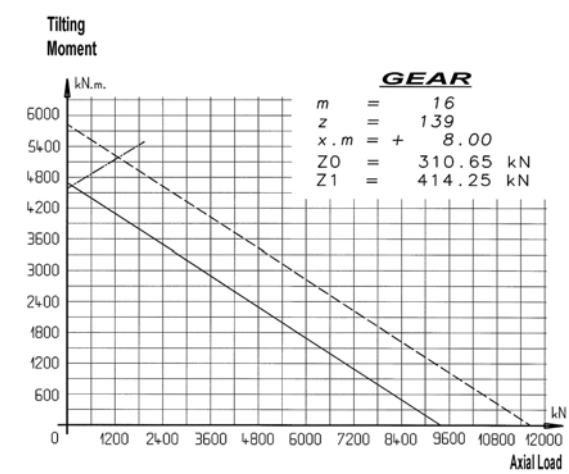




Estimated Weight: 1004 kg

06.2002.00



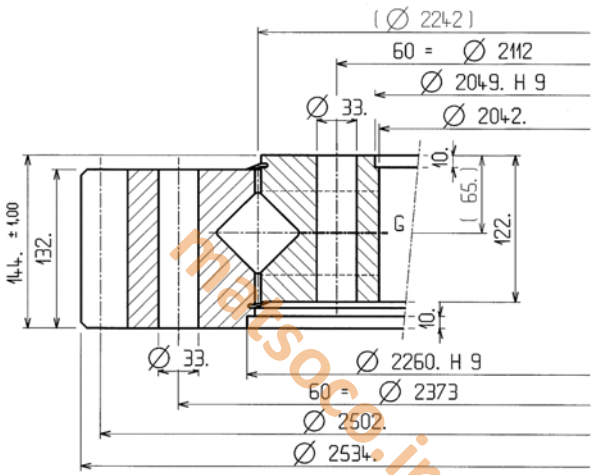


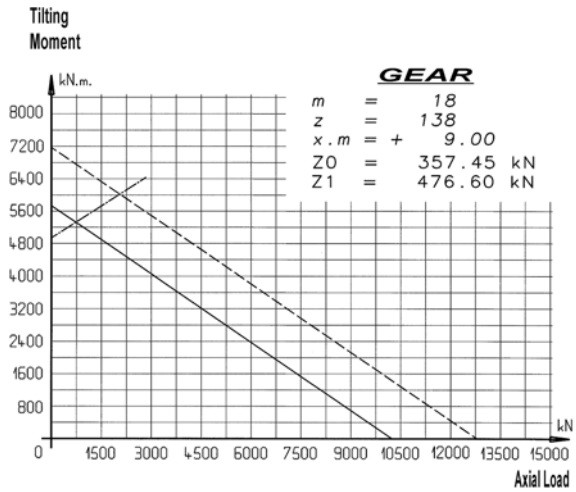
Estimated Weight: 1174 kg

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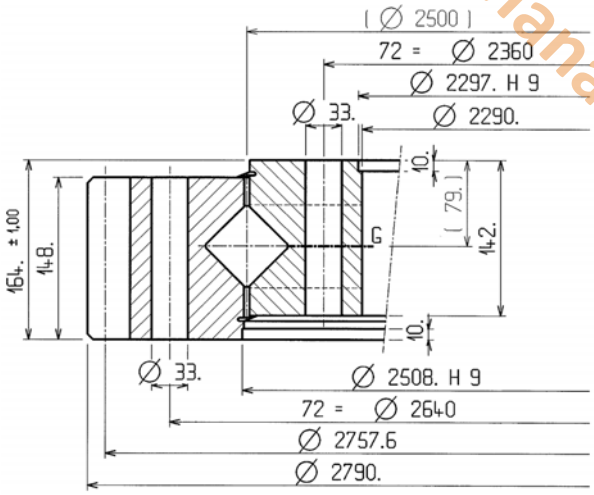
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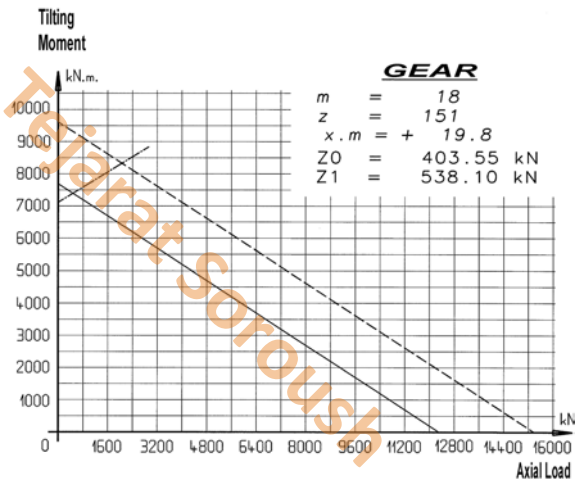




Estimated Weight: 1482 kg

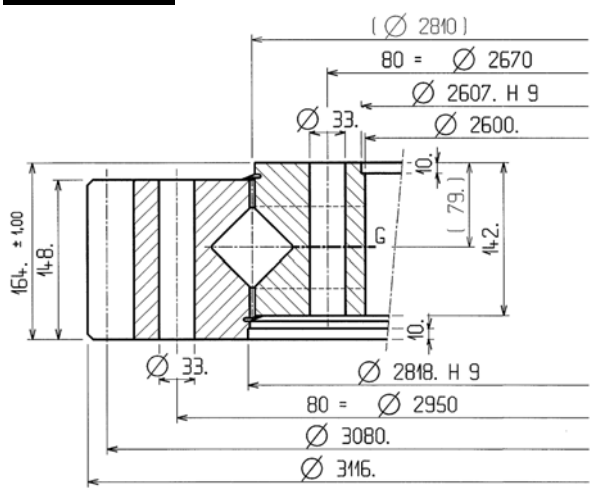
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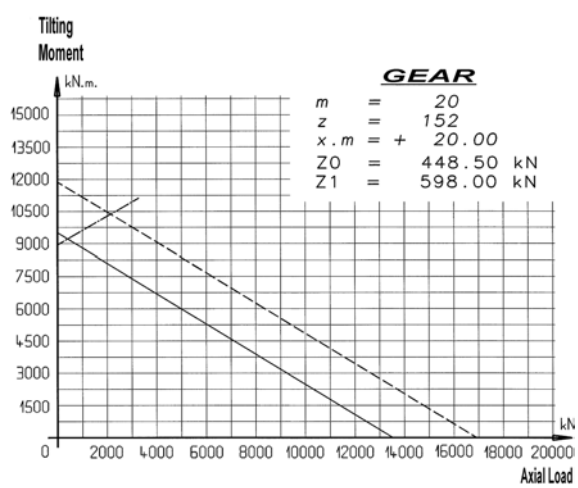




Estimated Weight: 1895 kg

06.2810.09



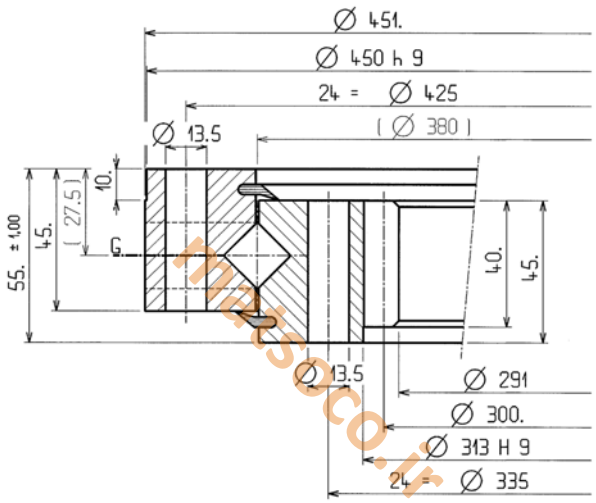


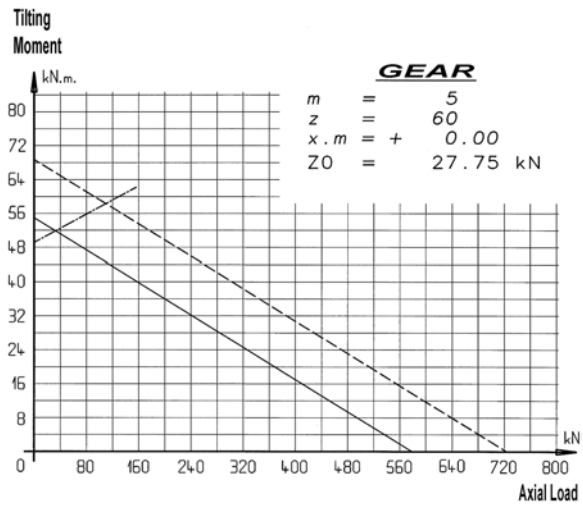
Estimated Weight: 2197 kg

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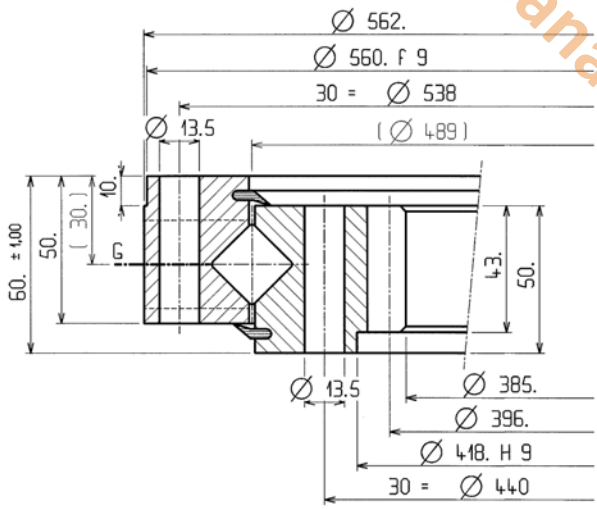
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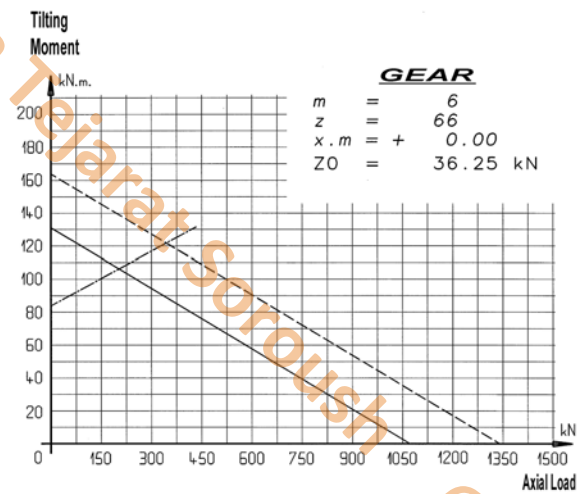




Estimated Weight: 28 kg

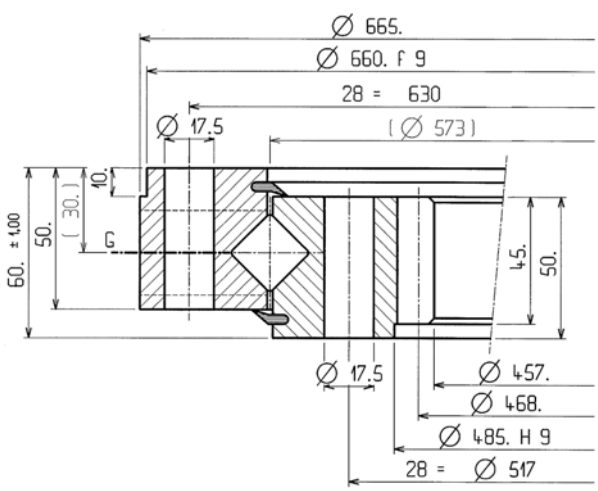
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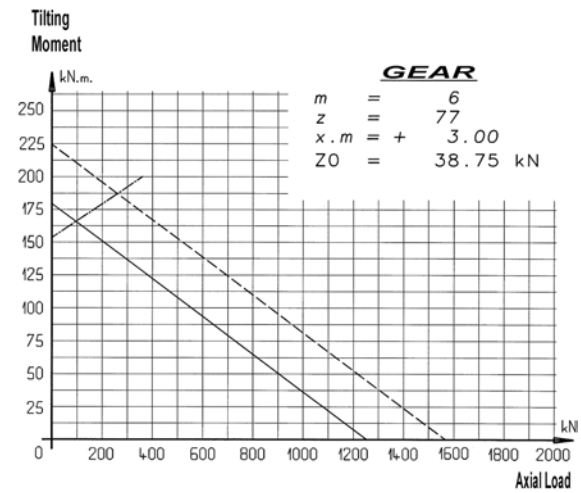




Estimated Weight: 44 kg

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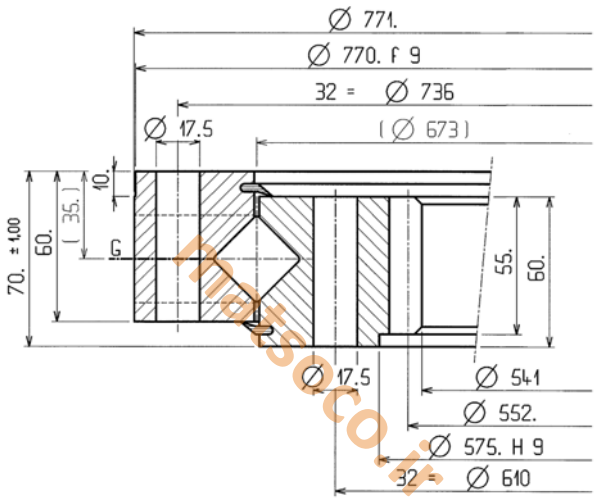


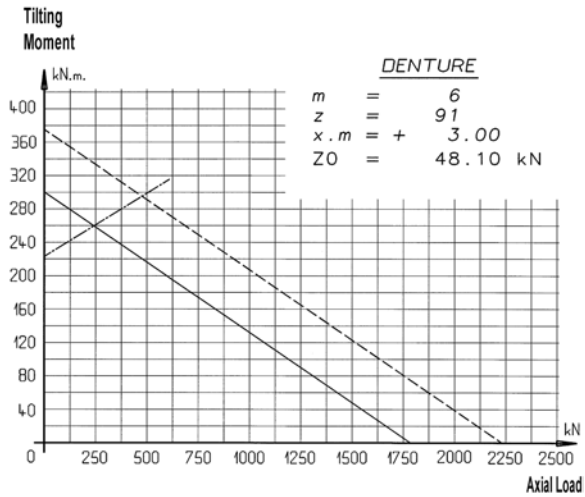
Estimated Weight: 61 kg

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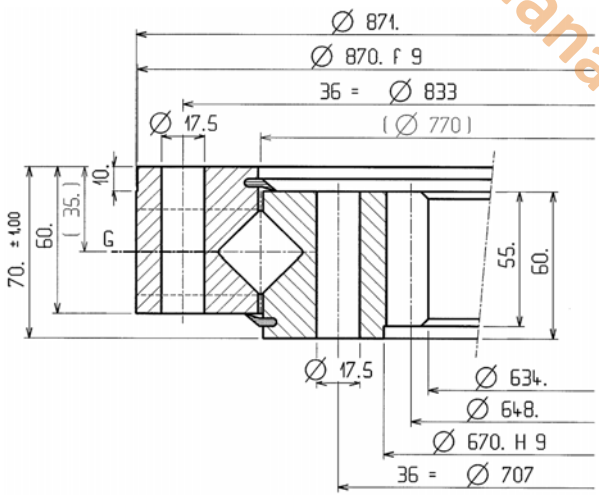
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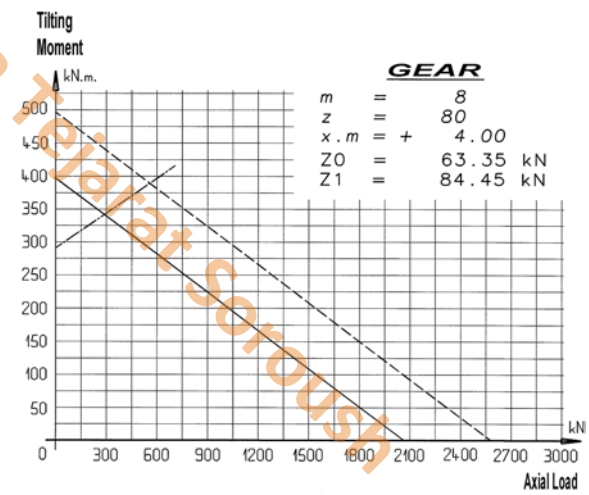




Estimated Weight: 96 kg

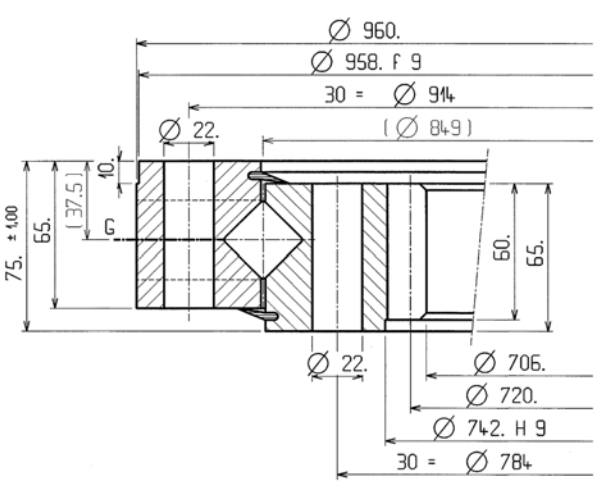
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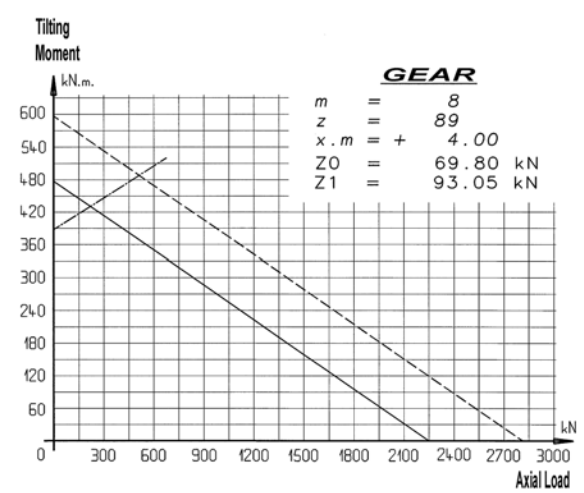




Estimated Weight: 113 kg

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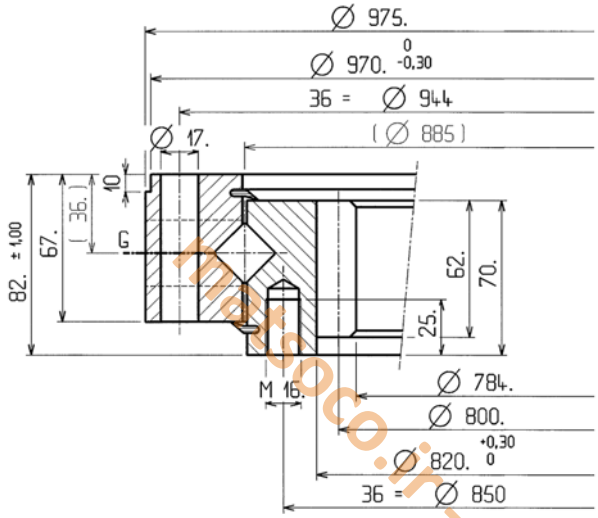


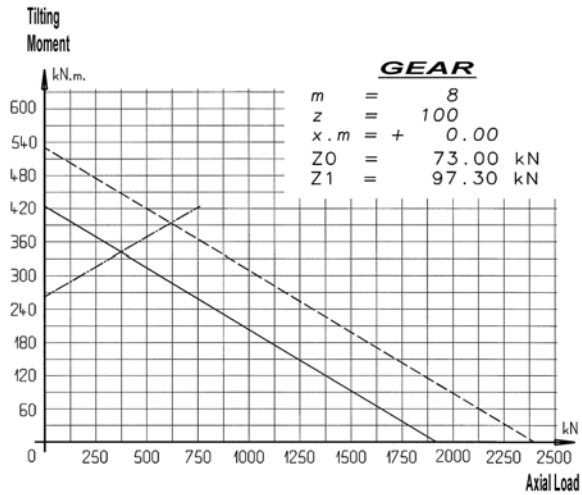
Estimated Weight: 144 kg

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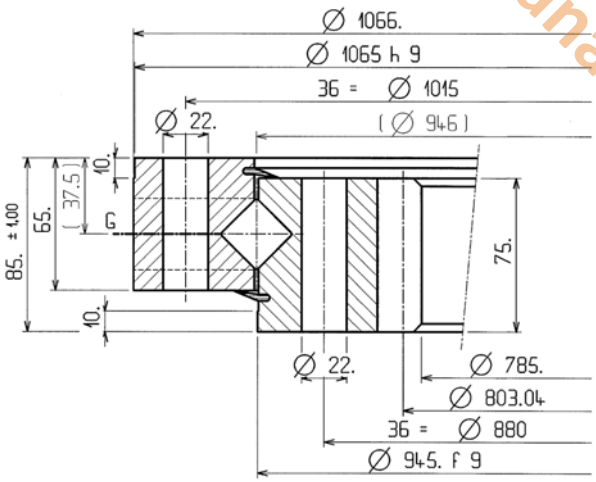
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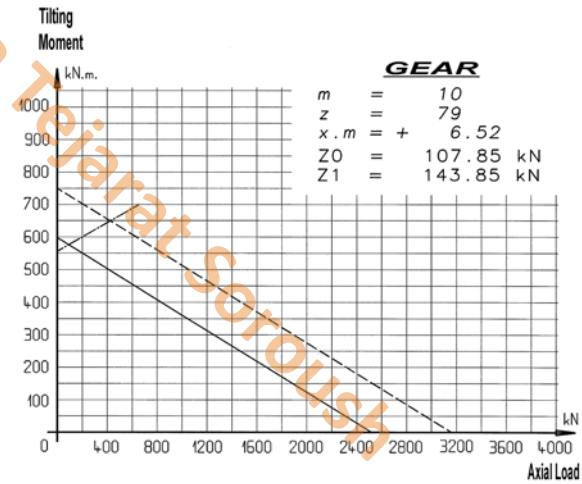




Estimated Weight: 120 kg

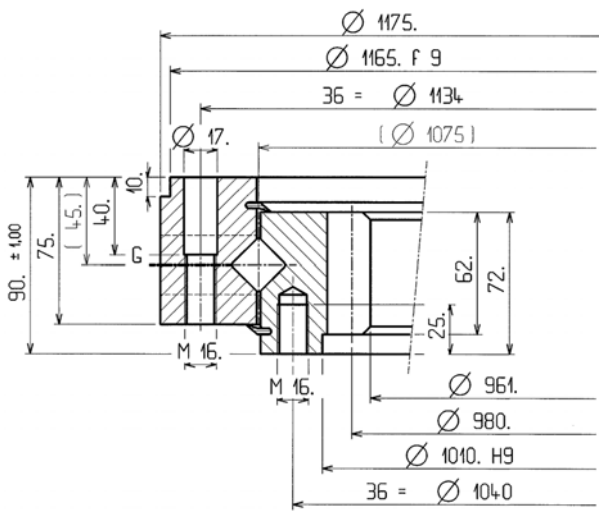
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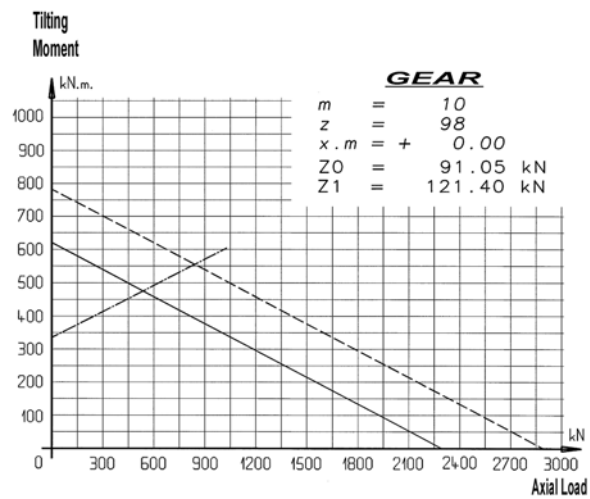




Estimated Weight: 190 kg

07.1075.01



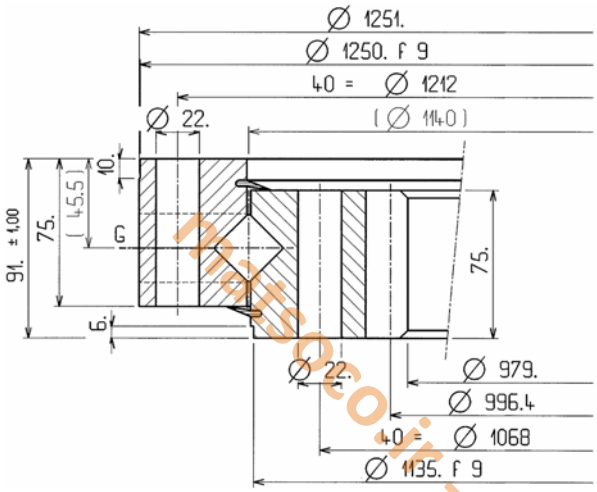


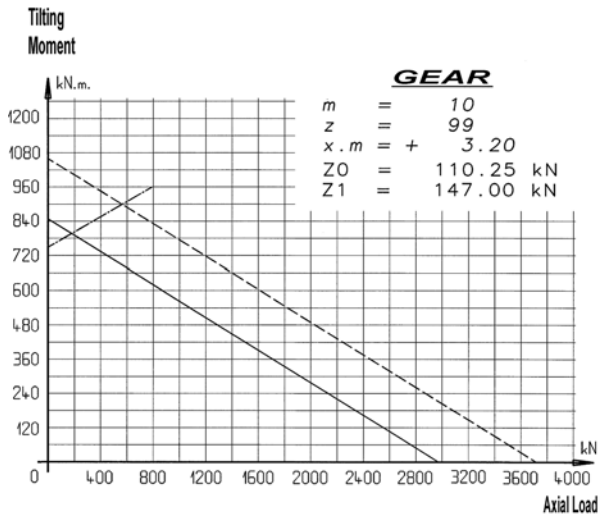
Estimated Weight: 179 kg

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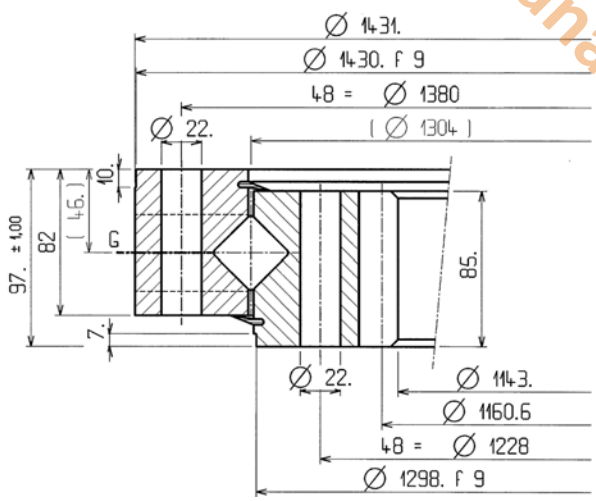
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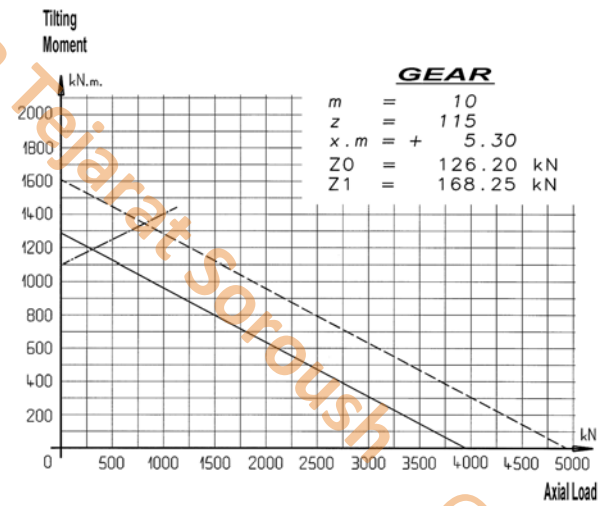




Estimated Weight: 238 kg

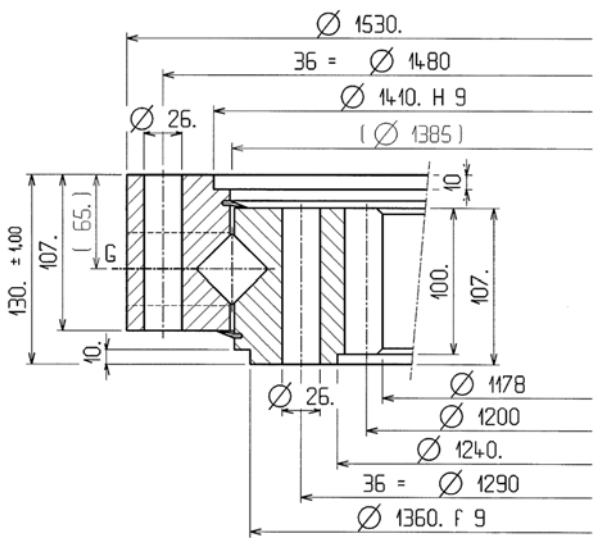
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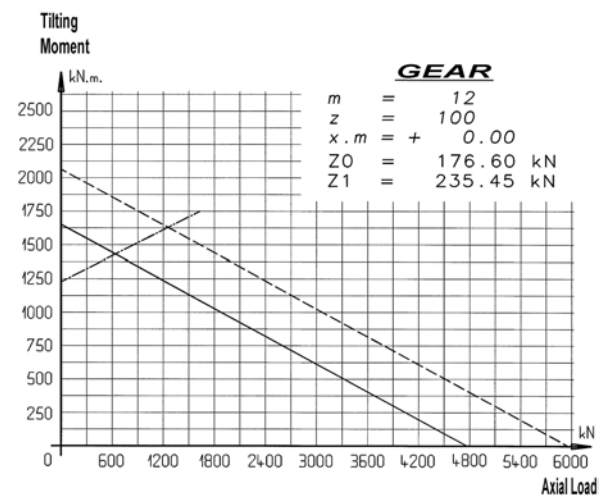




Estimated Weight: 323 kg

07.1385.03



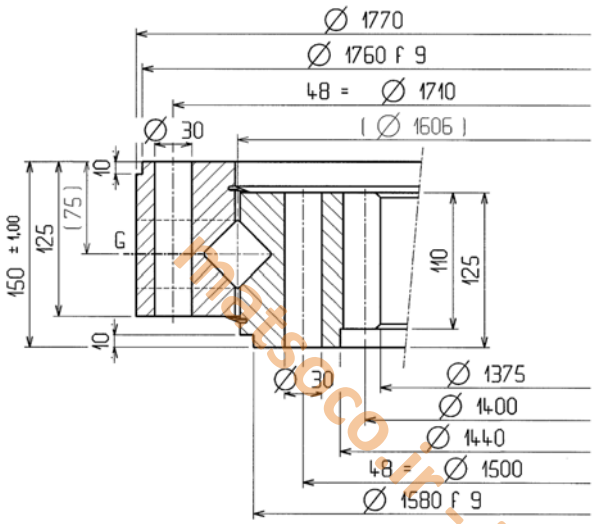


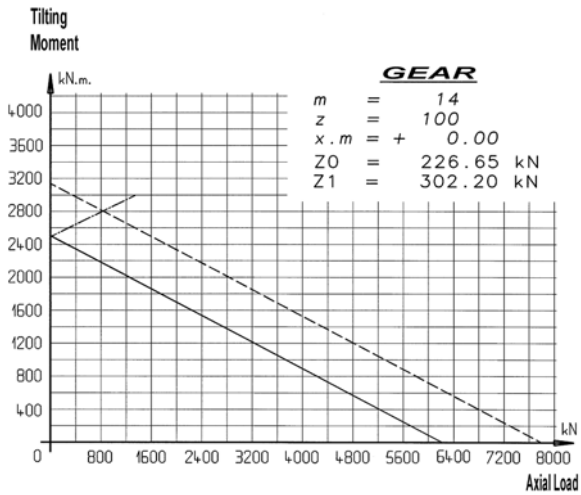
Estimated Weight: 541 kg

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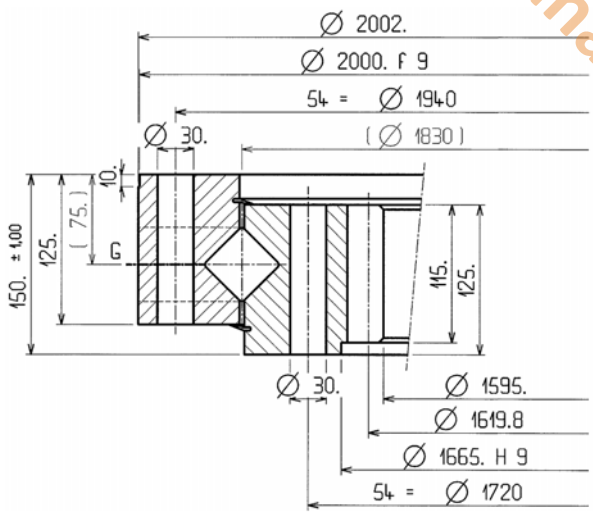
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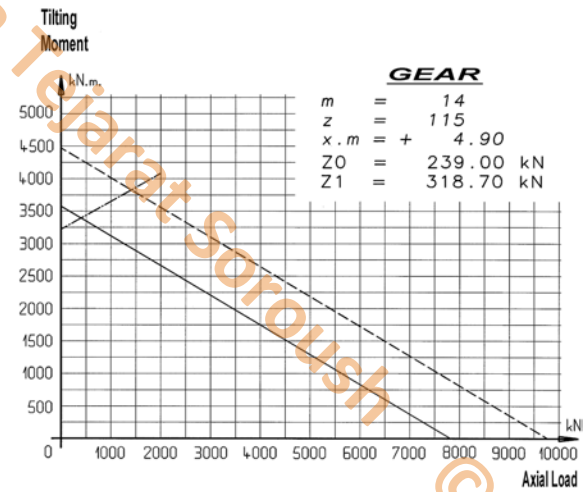




Estimated Weight: 802 kg

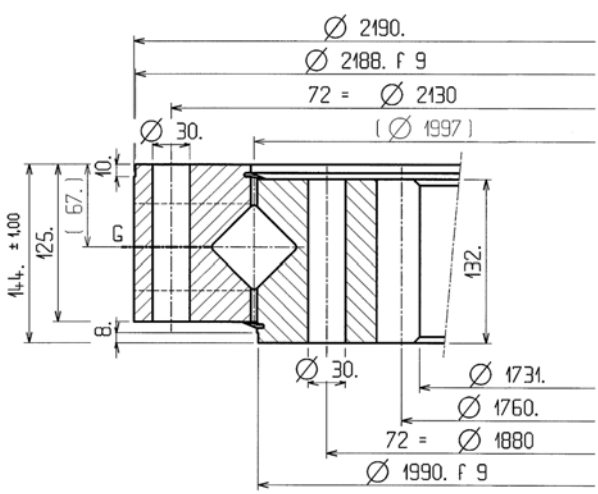
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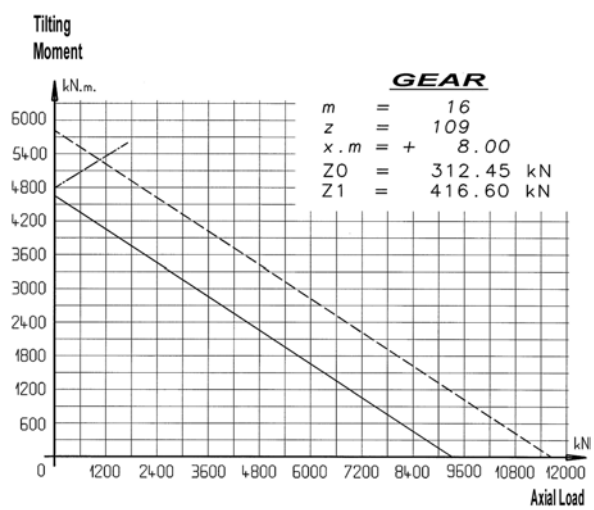




Estimated Weight: 951 kg

07.1997.04



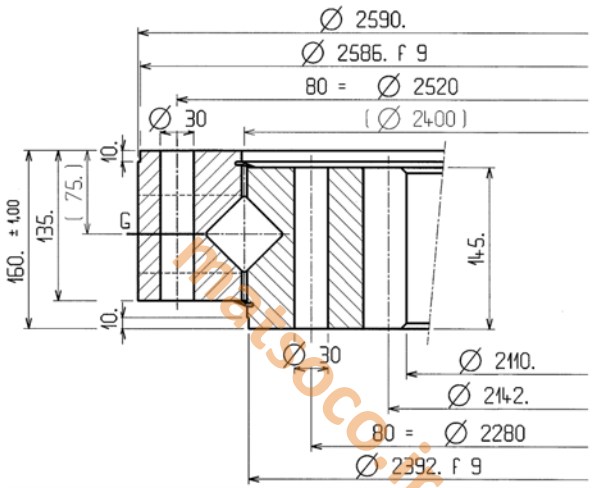


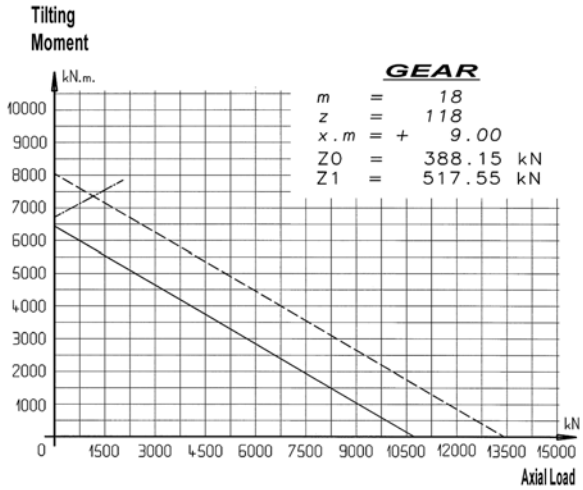
Estimated Weight: 1199 kg

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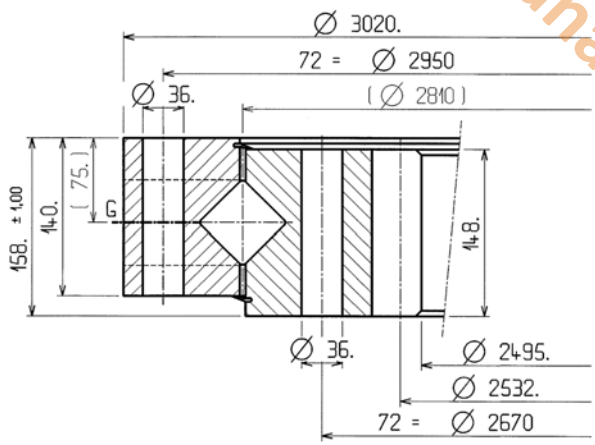
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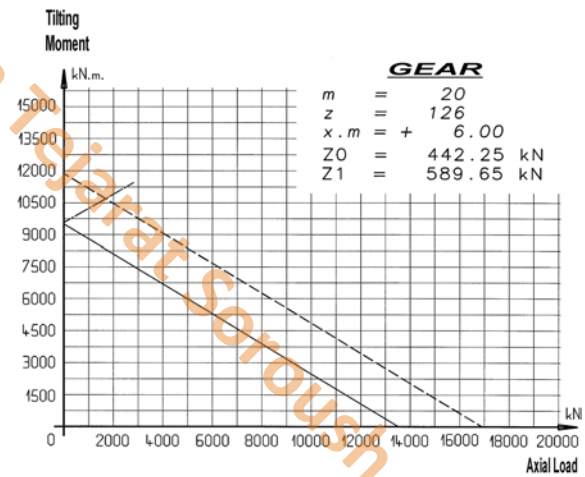




Estimated Weight: 1639 kg

07.2810.09



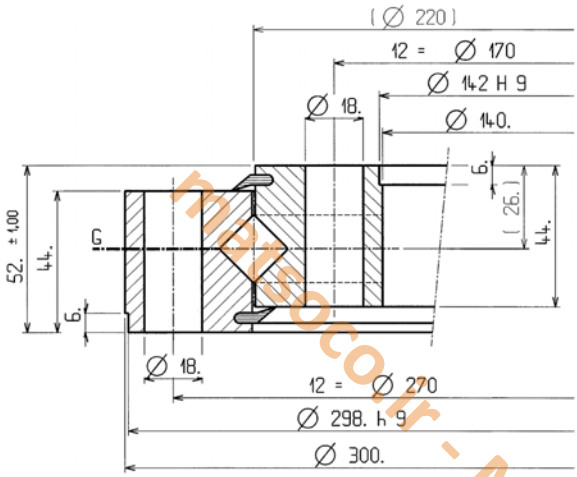


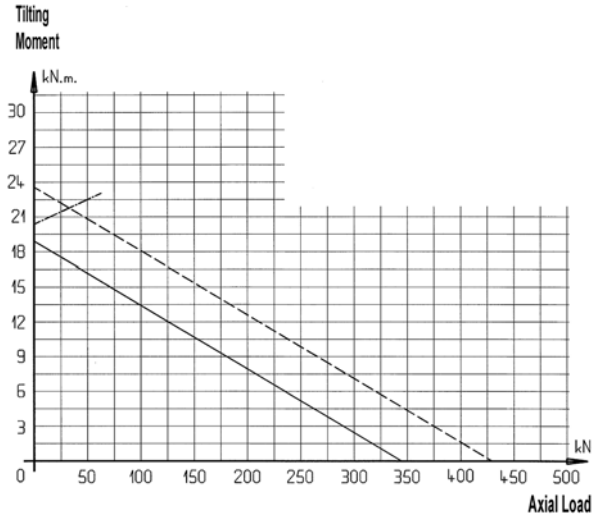
Estimated Weight: 2154 kg

Mahsoor - Manal Nejarat Soroush ©

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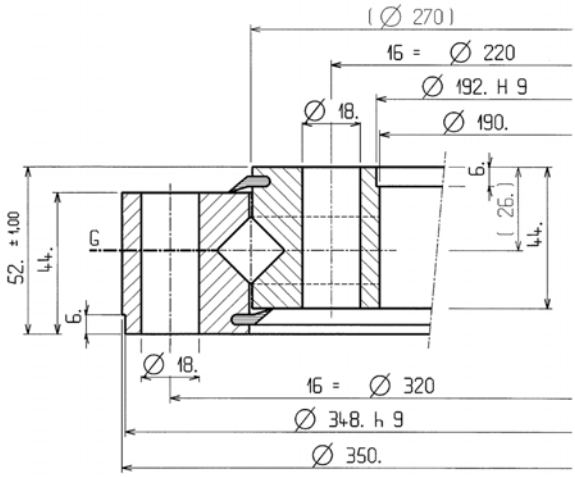
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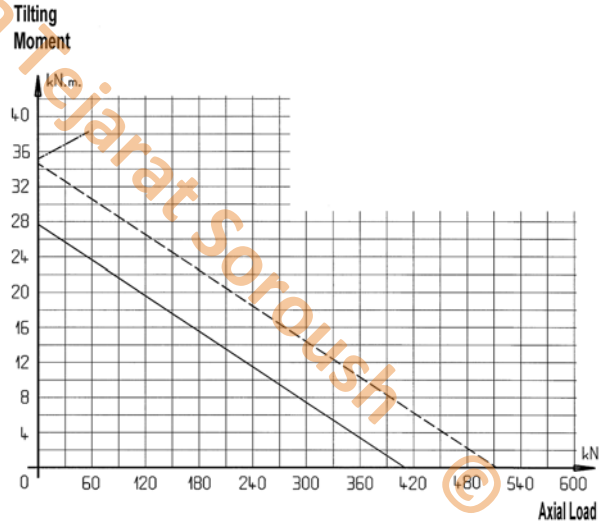




Estimated Weight: 16 kg

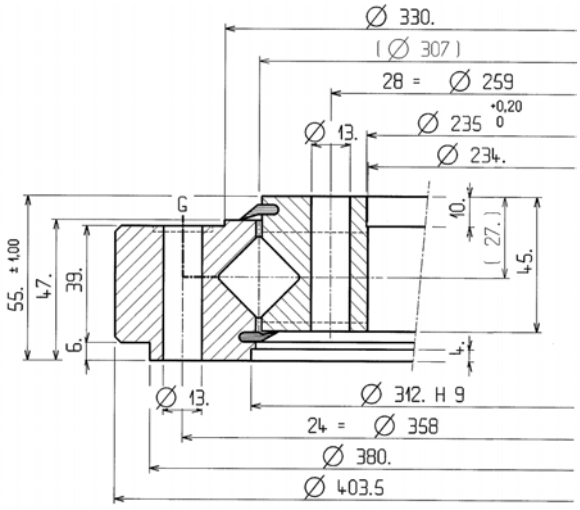
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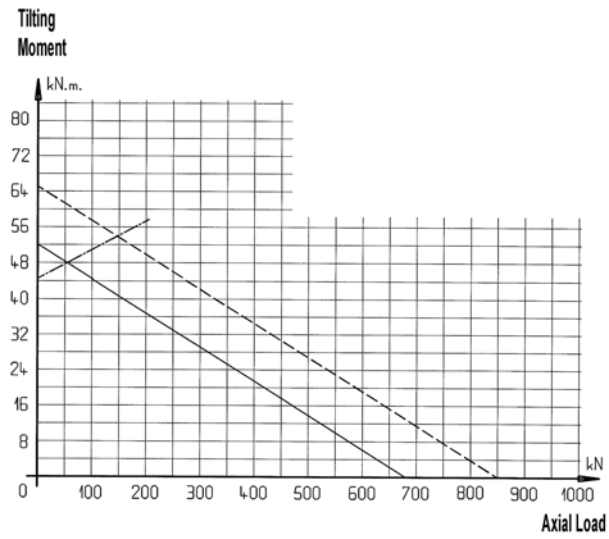




Estimated Weight: 20 kg

08.0307.00



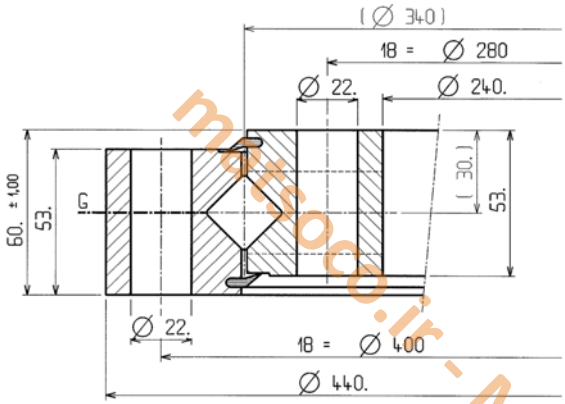


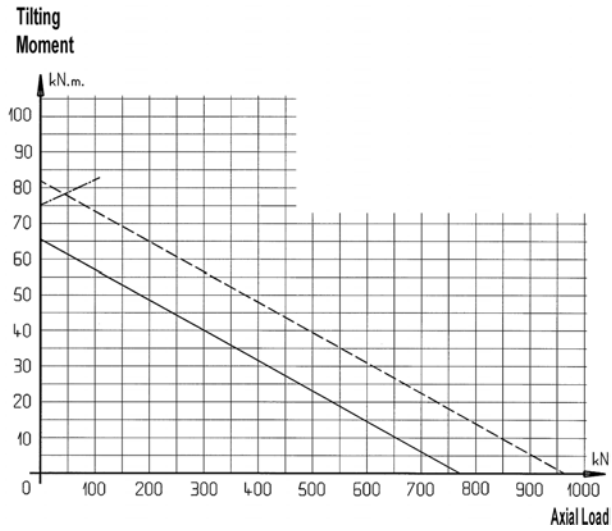
Estimated Weight: 26 kg

REFER TO PAGES 54 AND 55 FOR THE INTERPRETATION OF DRAWINGS AND CURVES

maleocoir - Manafejarat soroush ©

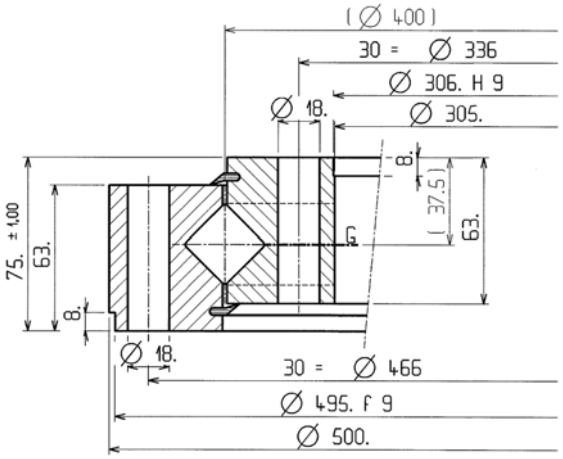
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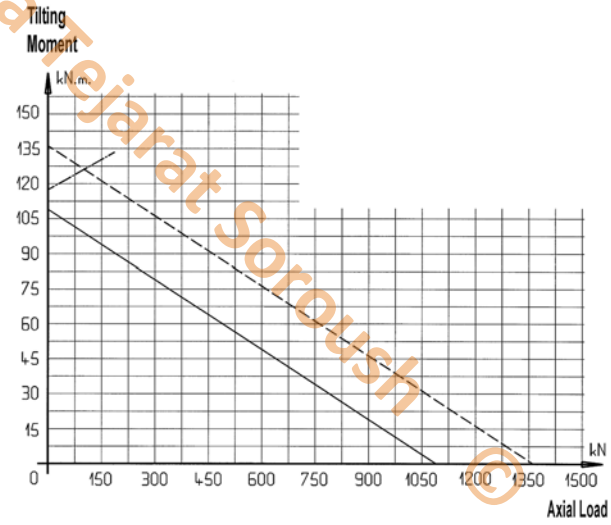




Estimated Weight: 37 kg

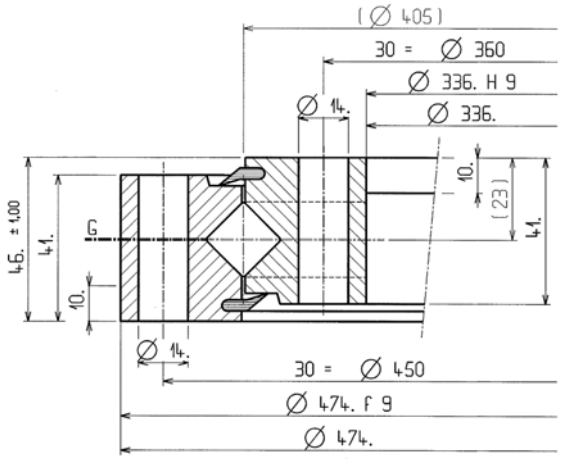
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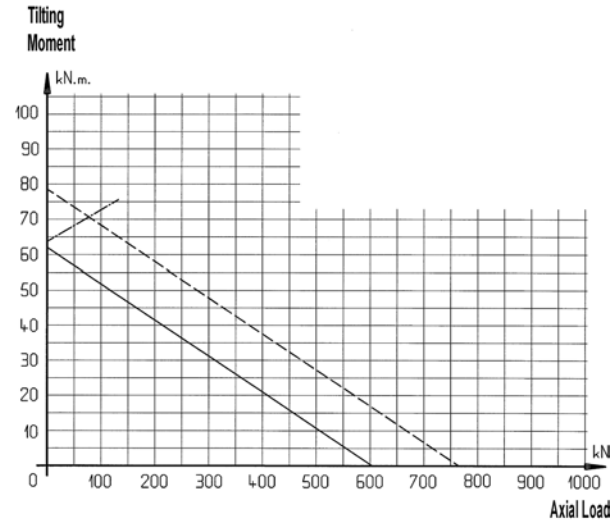




Estimated Weight: 51 kg

08.0404.05



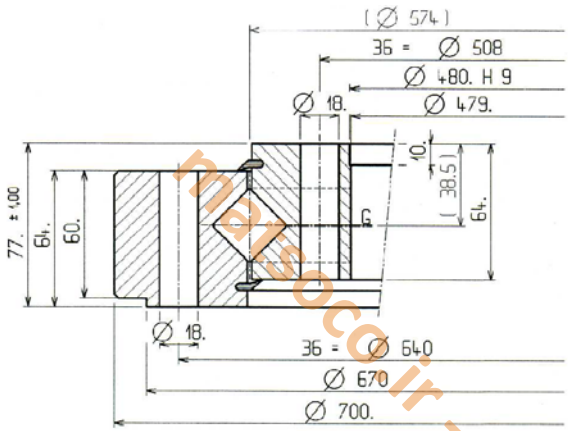


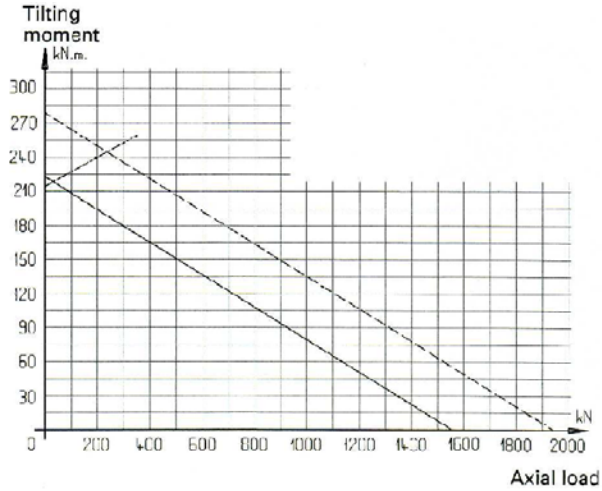
Estimated Weight: 24 kg

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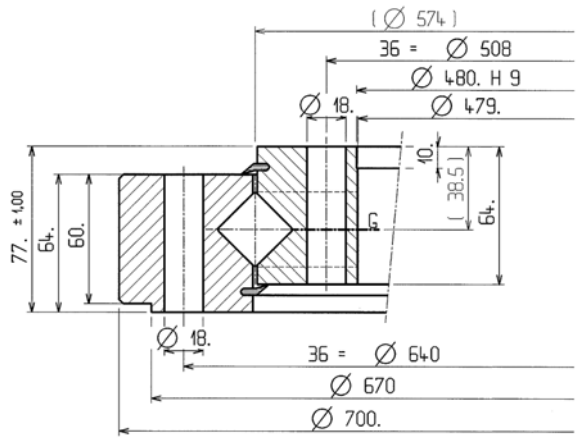
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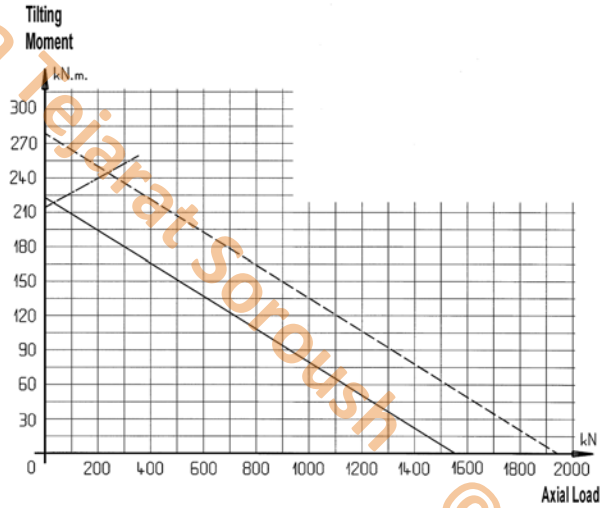




Estimated Weight: 66 kg

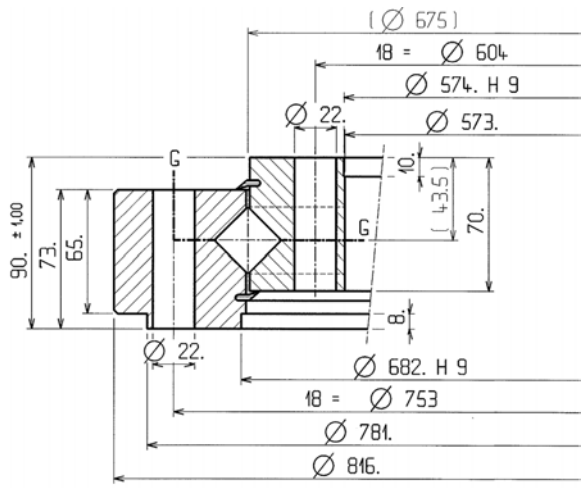
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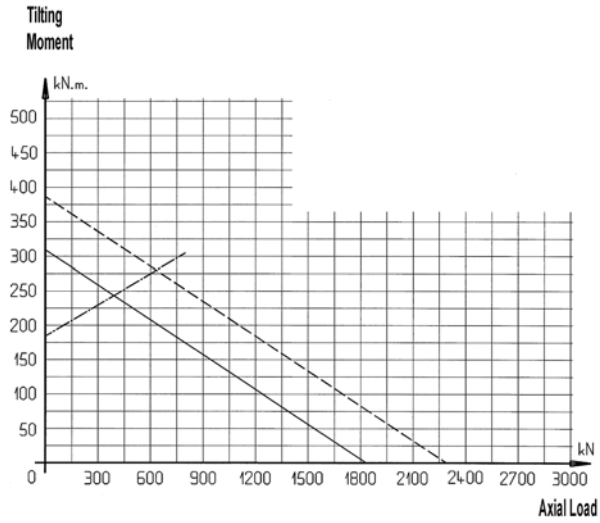




Estimated Weight: 90 kg

08.0675.00



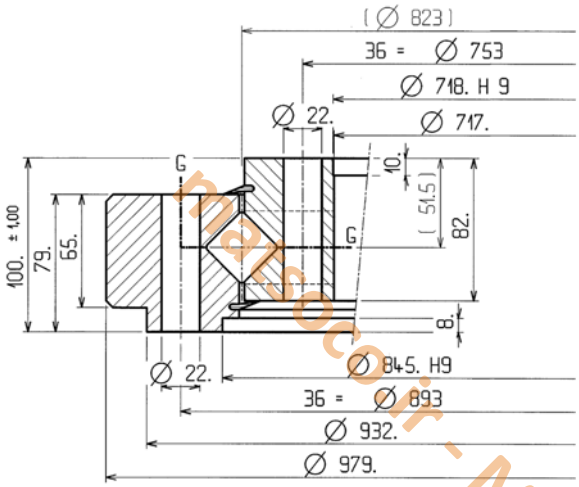


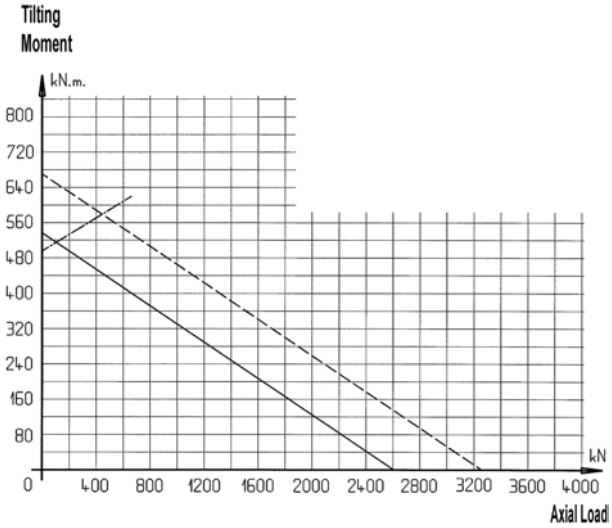
Estimated Weight: 137 kg

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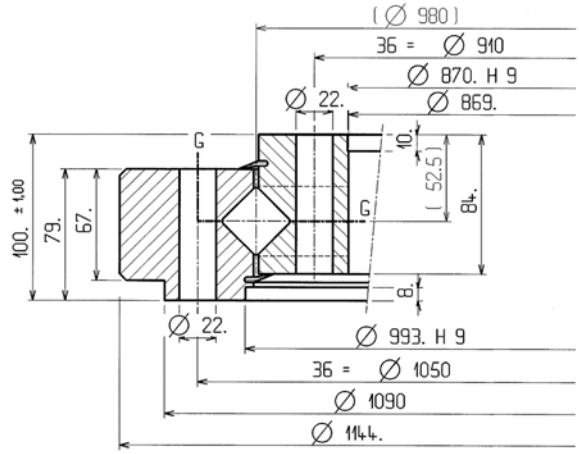
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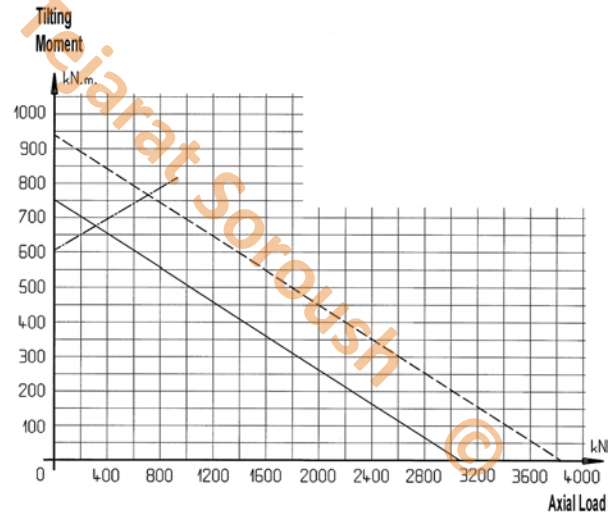




Estimated Weight: 193 kg

08.0980.06



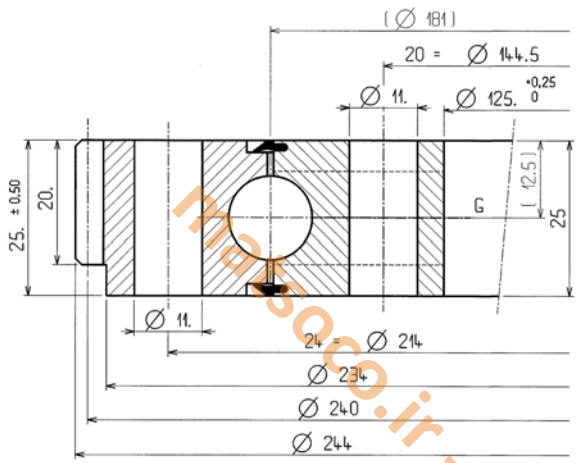


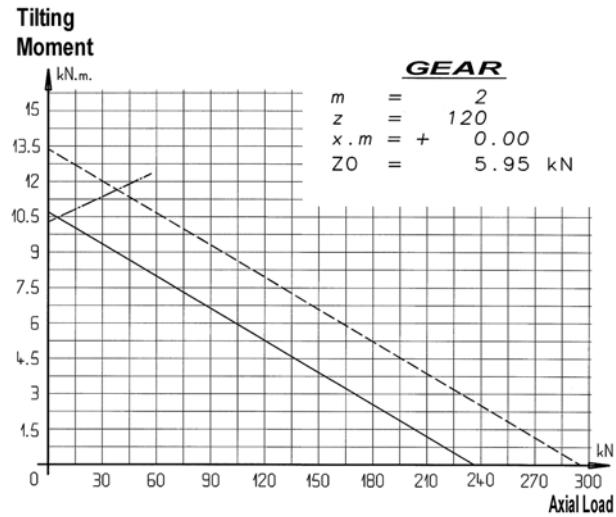
Estimated Weight: 248 kg

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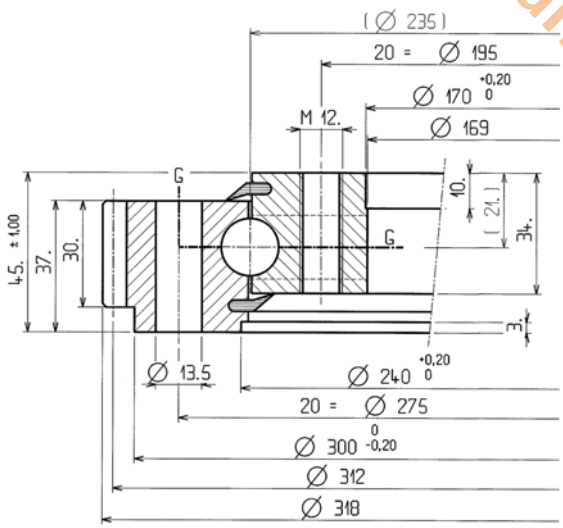
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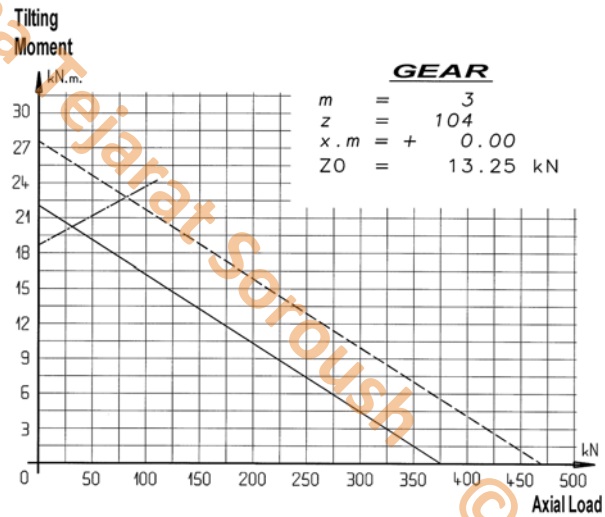




Estimated Weight: 5 kg

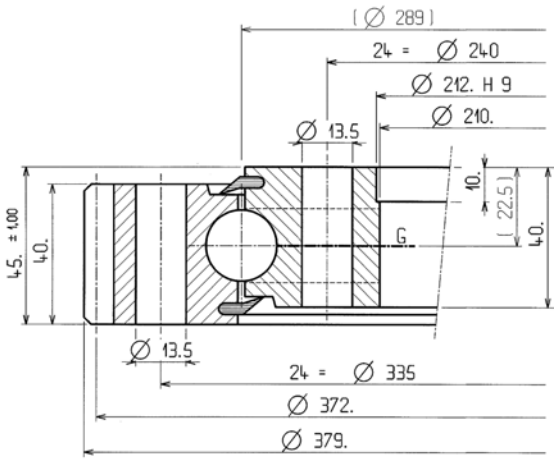
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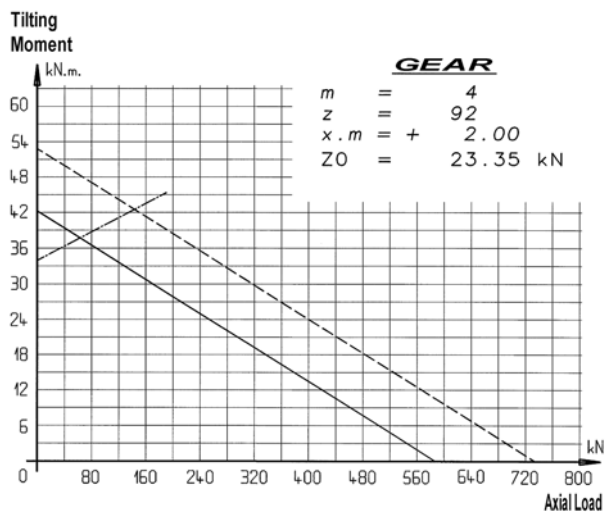




Estimated Weight: 14 kg

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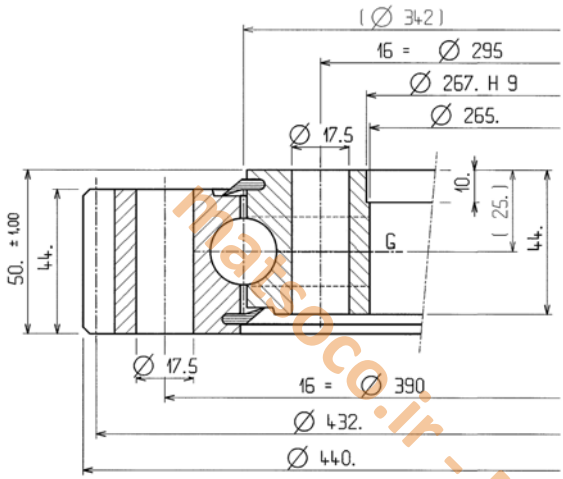


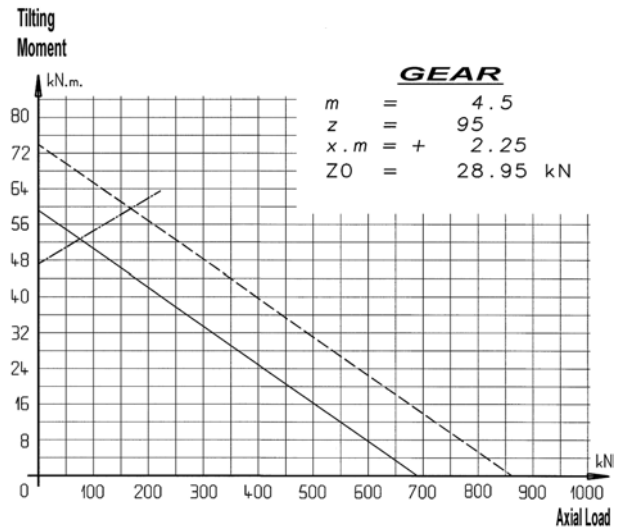
Estimated Weight: 20 kg

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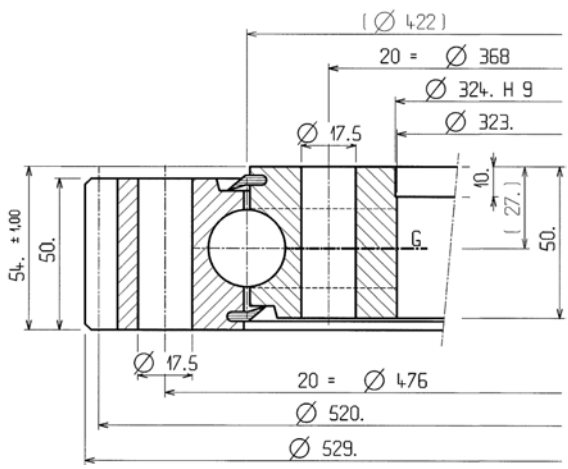
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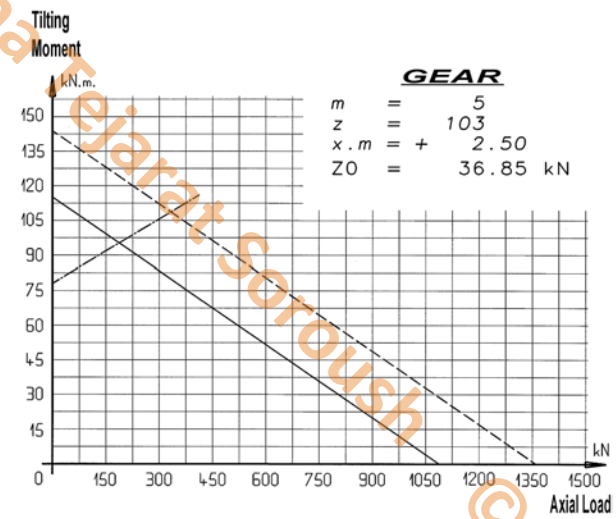




Estimated Weight: 28 kg

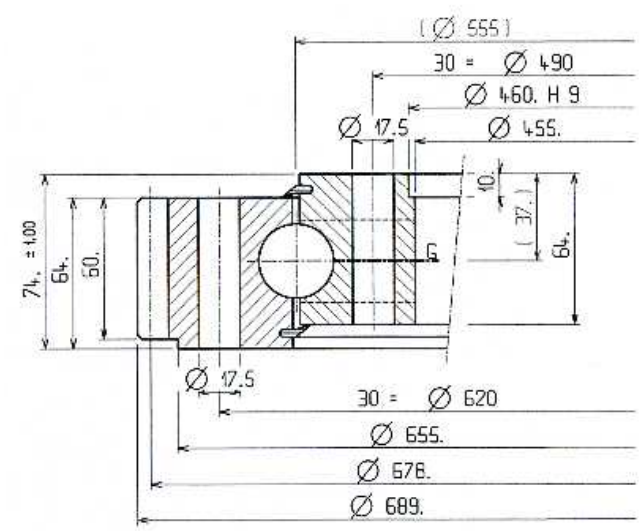
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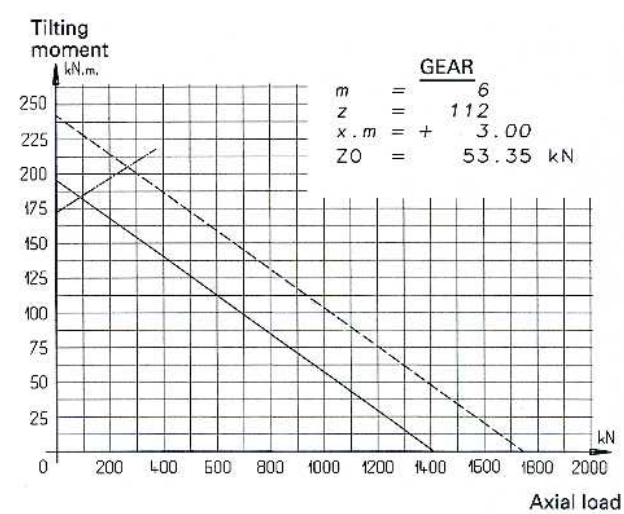




Estimated Weight: 45 kg

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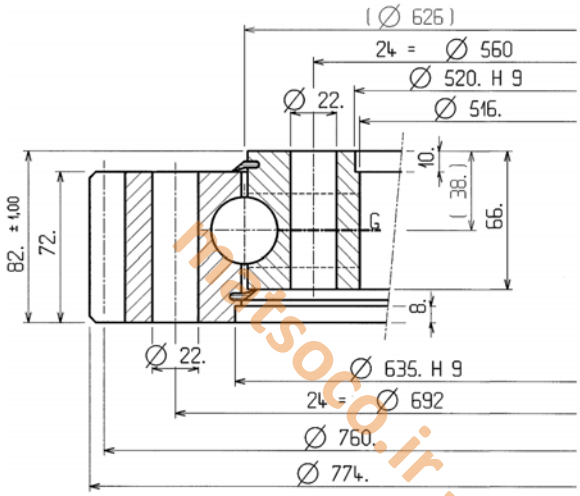


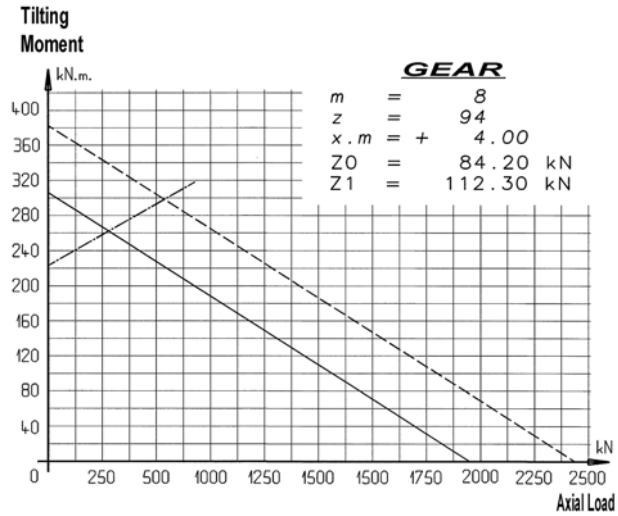
Estimated Weight: 89 kg

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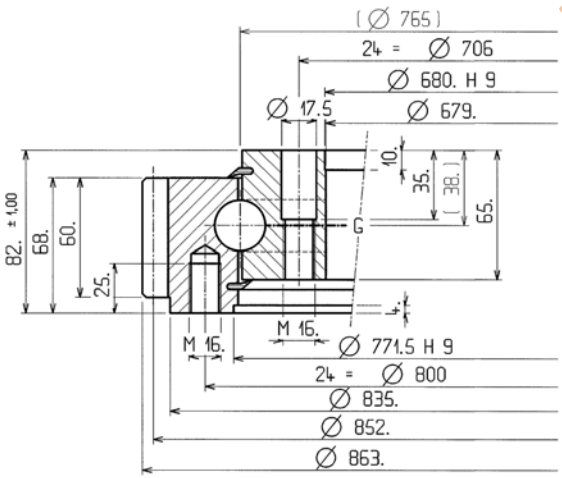
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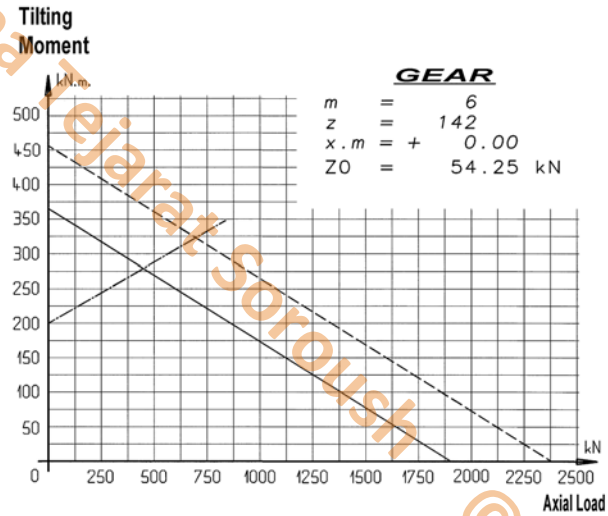




Estimated Weight: 118 kg

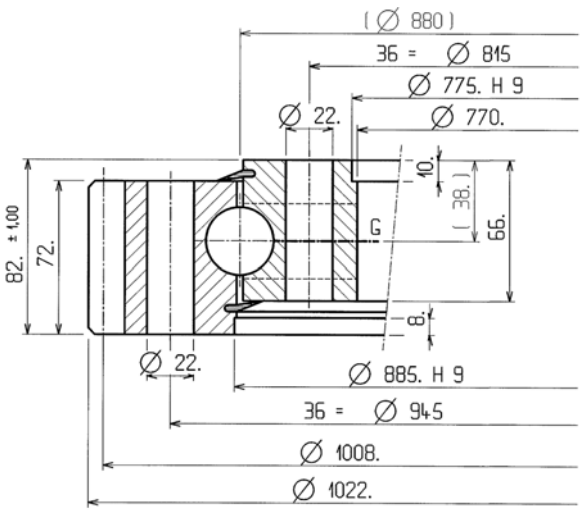
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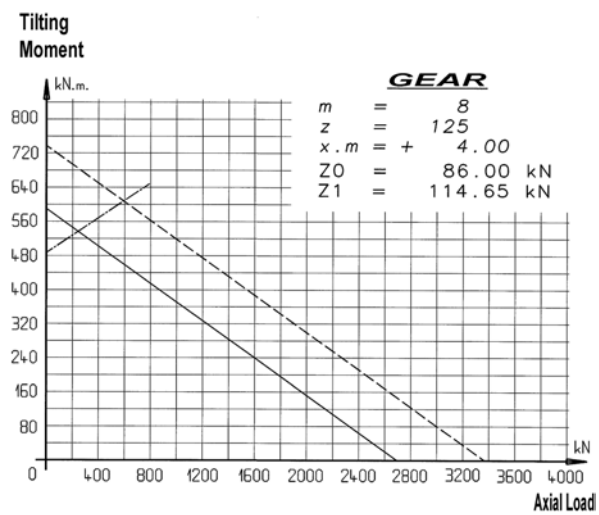




Estimated Weight: 102 kg

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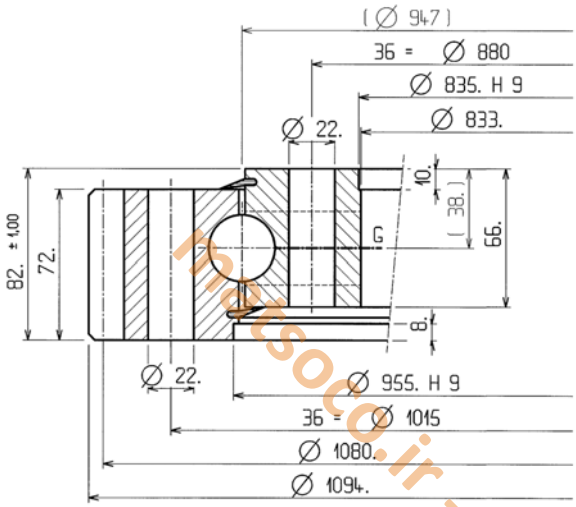


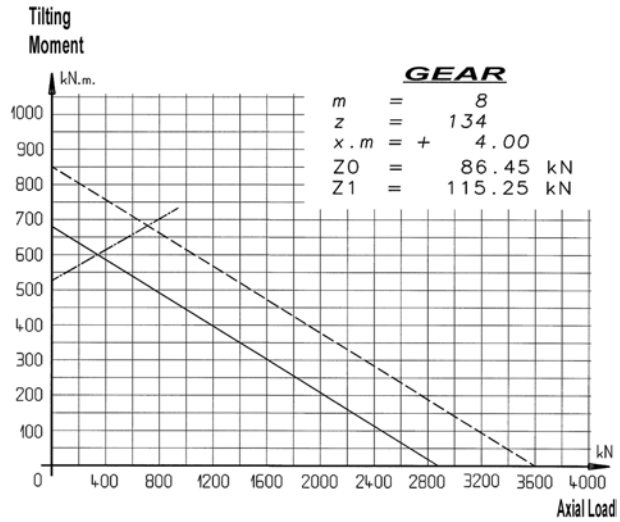
Estimated Weight: 159 kg

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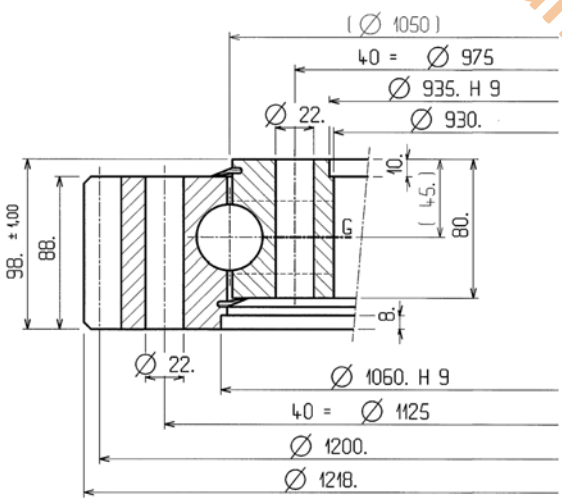
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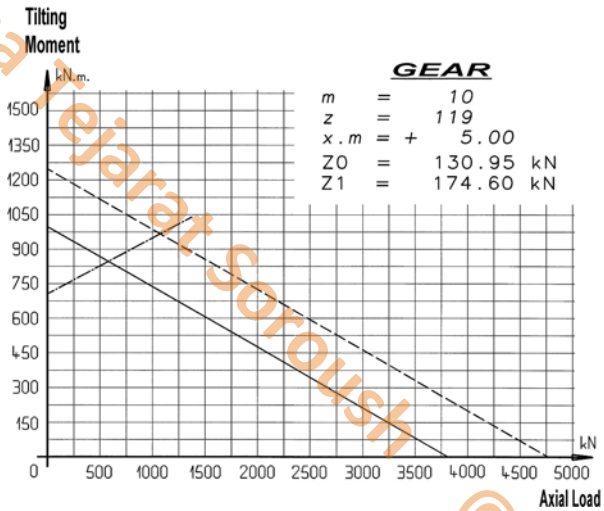




Estimated Weight: 179 kg

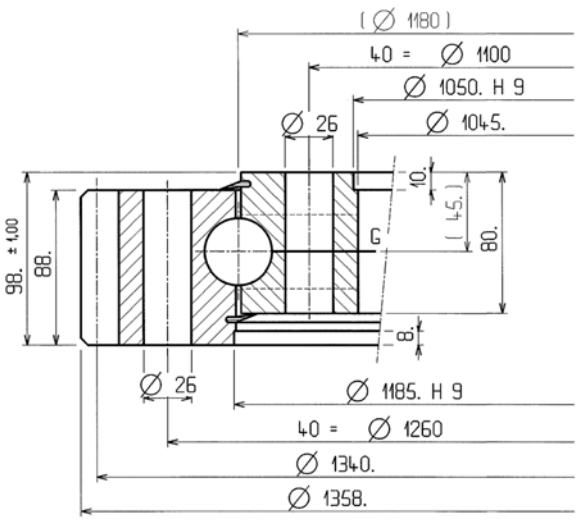
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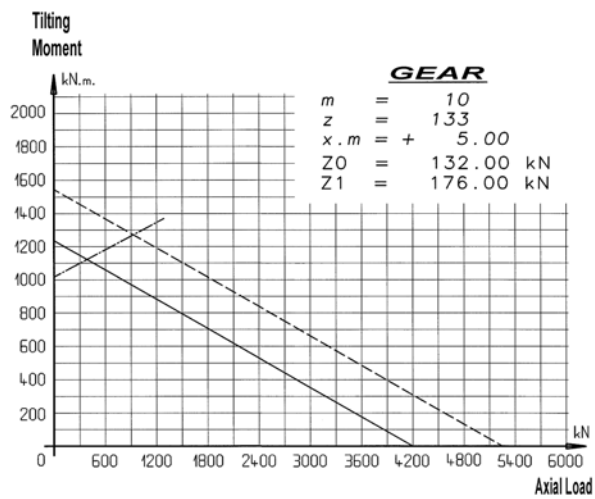




Estimated Weight: 268 kg

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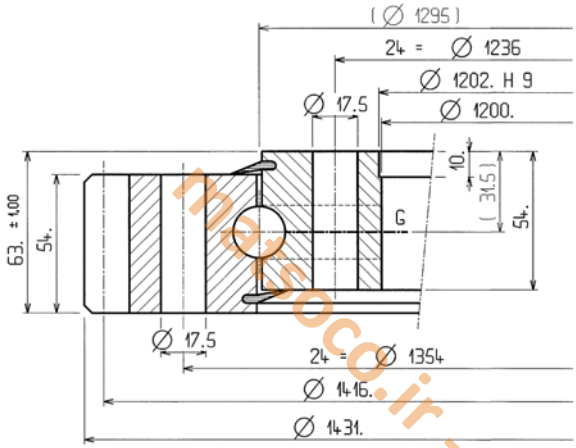


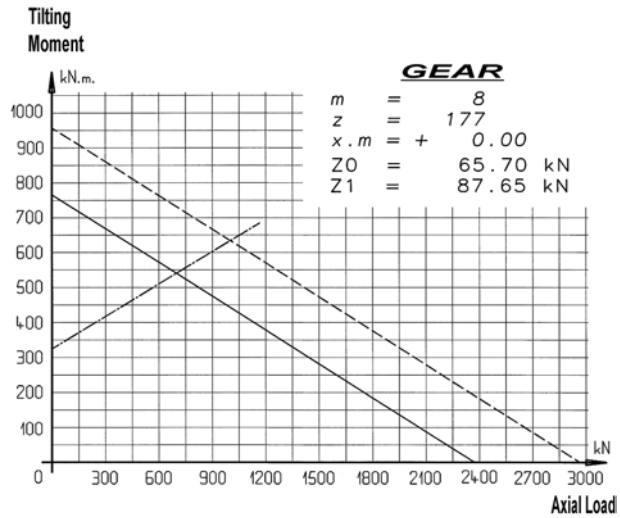
Estimated Weight: 325 kg

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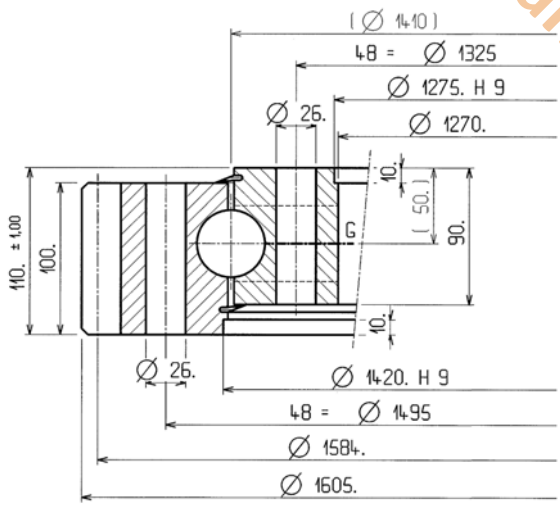
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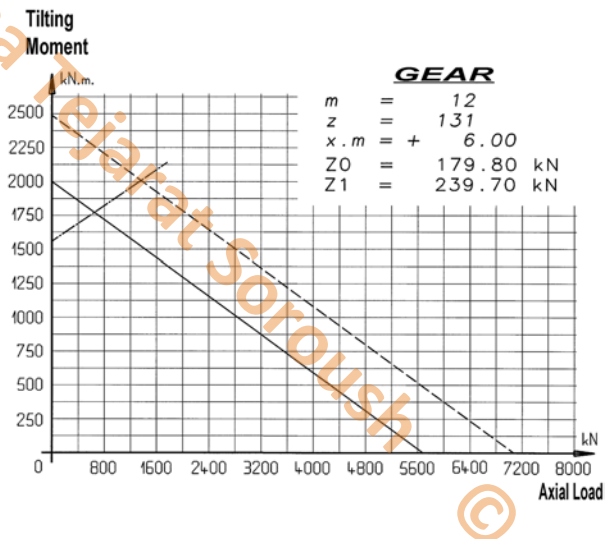




Estimated Weight: 176 kg

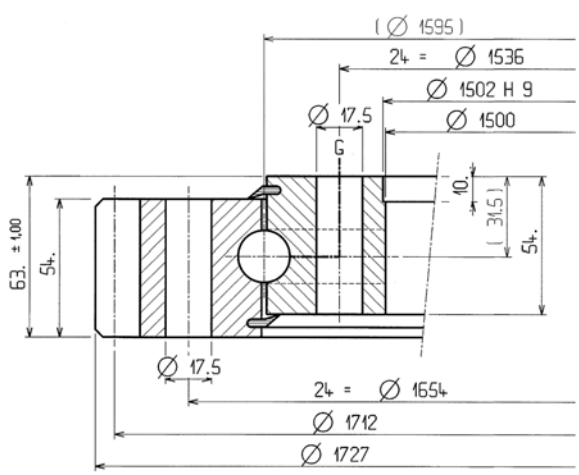
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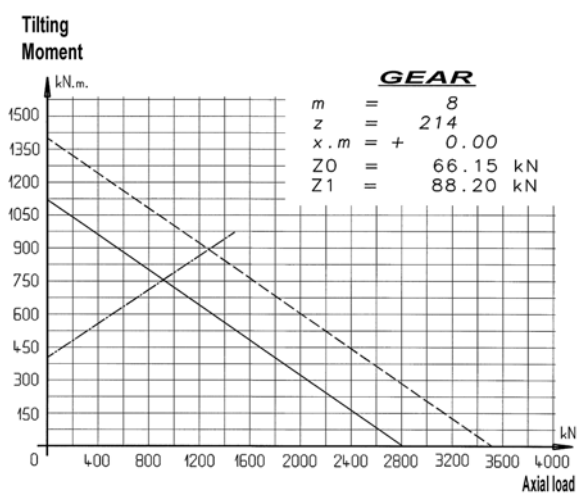




Estimated Weight: 469 kg

01.1595.00



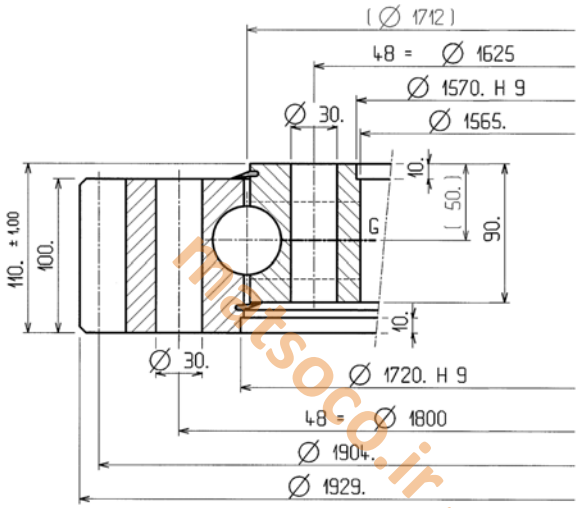


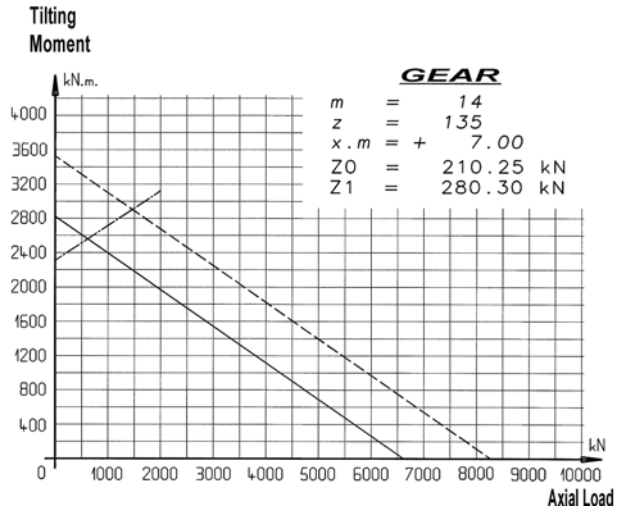
Estimated Weight: 213 kg

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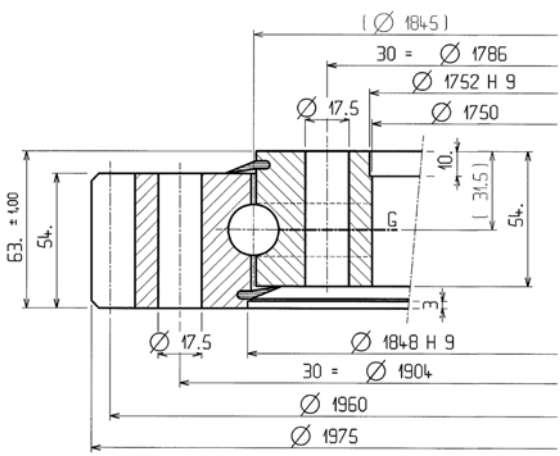
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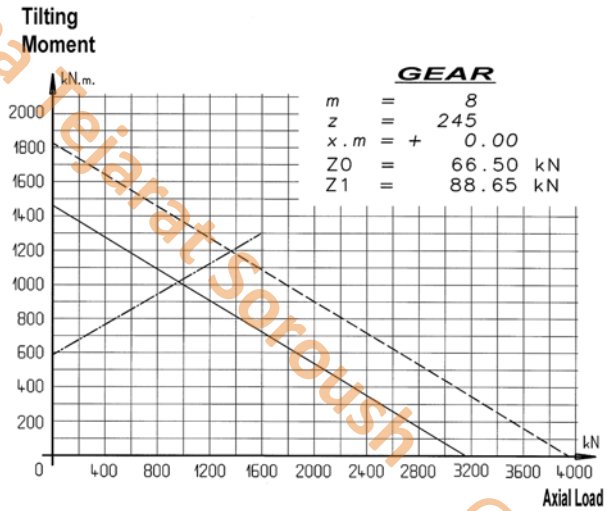




Estimated Weight: 617 kg

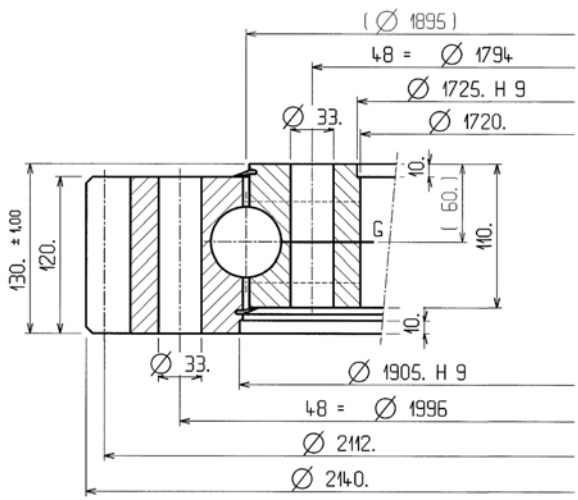
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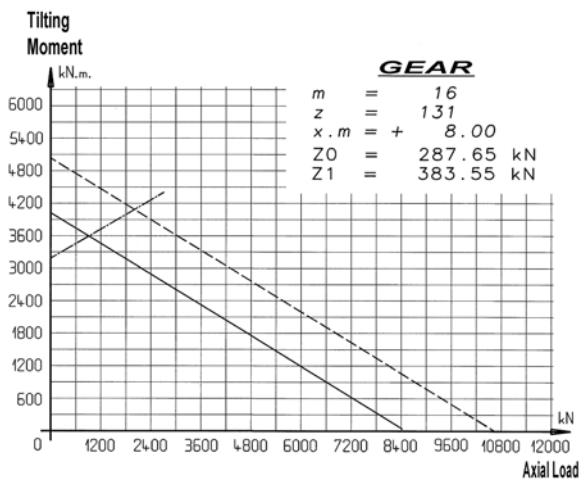




Estimated Weight: 244 kg

01.1895.00



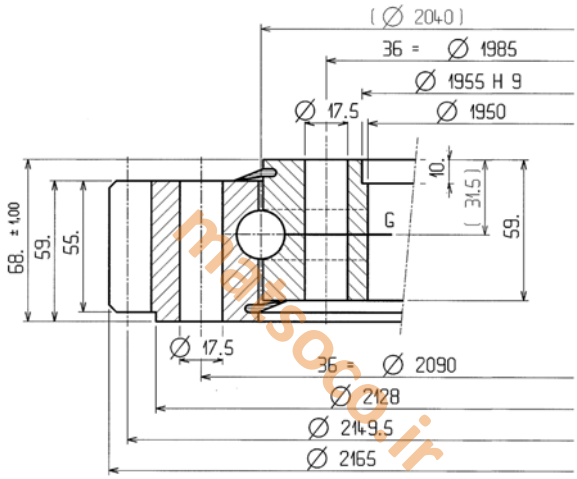


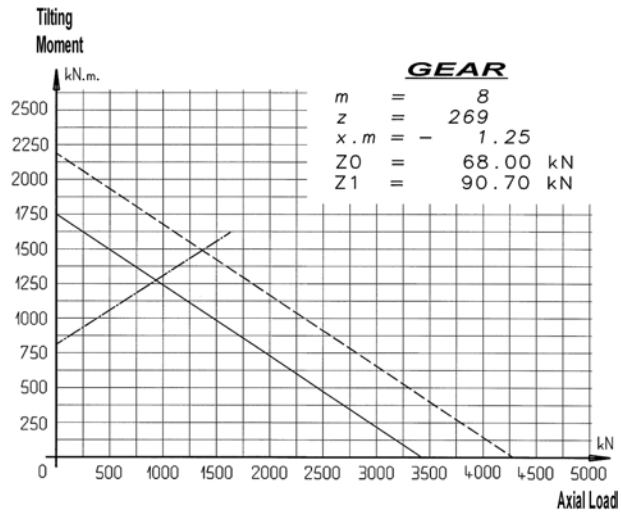
Estimated Weight: 953 kg

REFER TO PAGES 54 AND 55 FOR THE INTERPRETATION OF DRAWINGS AND CURVES

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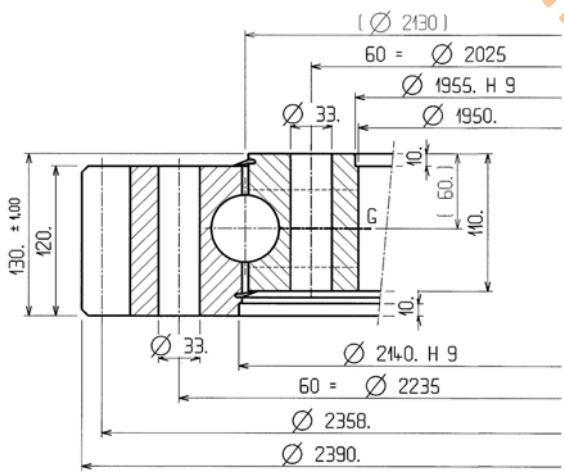
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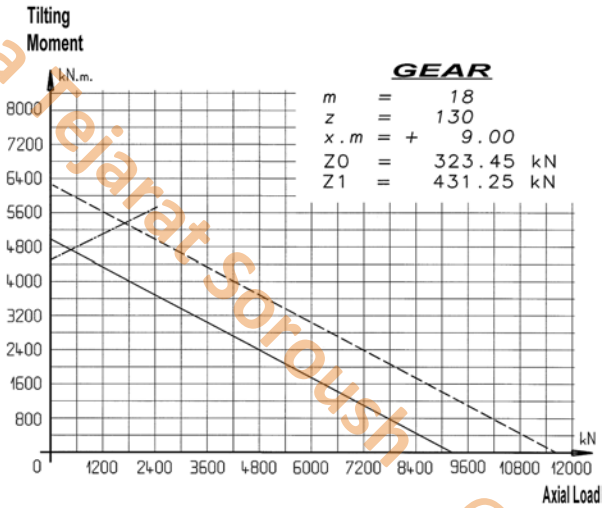




Estimated Weight: 278 kg

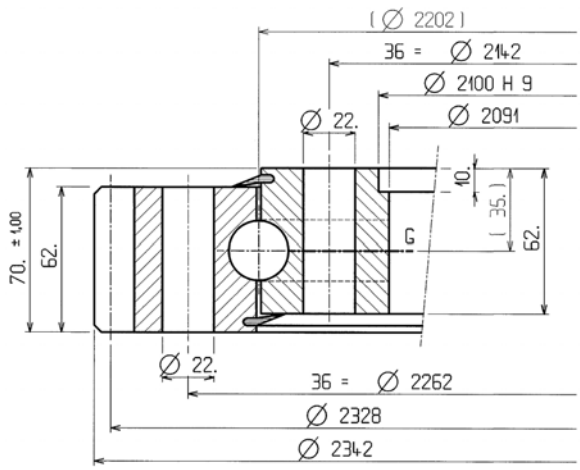
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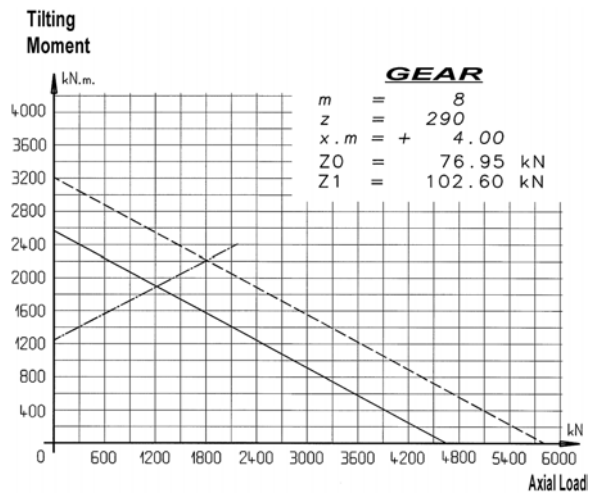




Estimated Weight: 1111 kg

01.2202.00



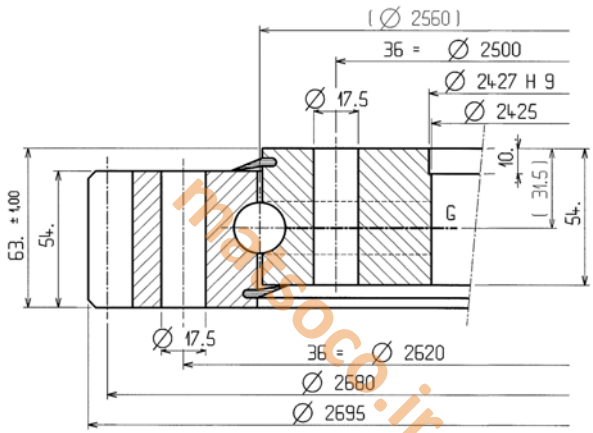


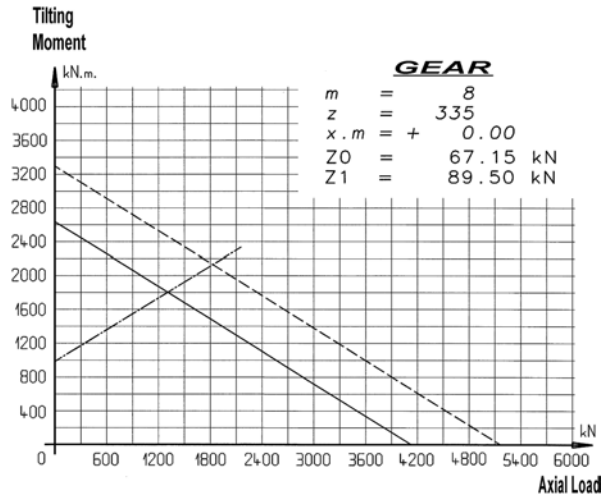
Estimated Weight: 373 kg

REFER TO PAGES 54 AND 55 FOR THE INTERPRETATION OF DRAWINGS AND CURVES

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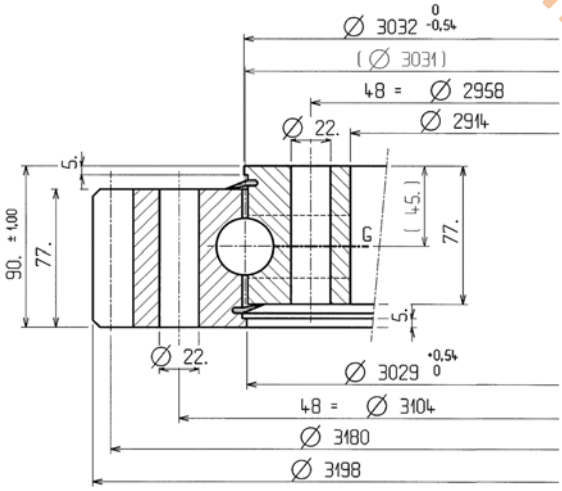
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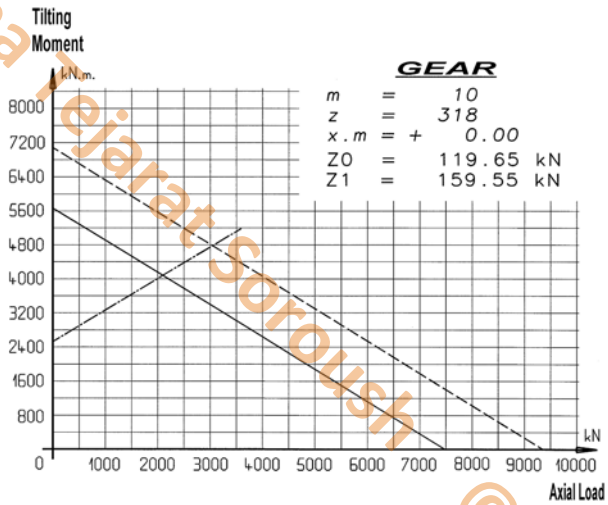




Estimated Weight: 411 kg

01.3031.00



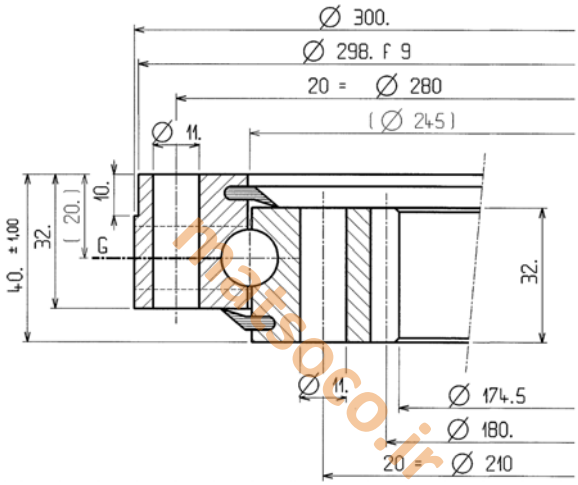


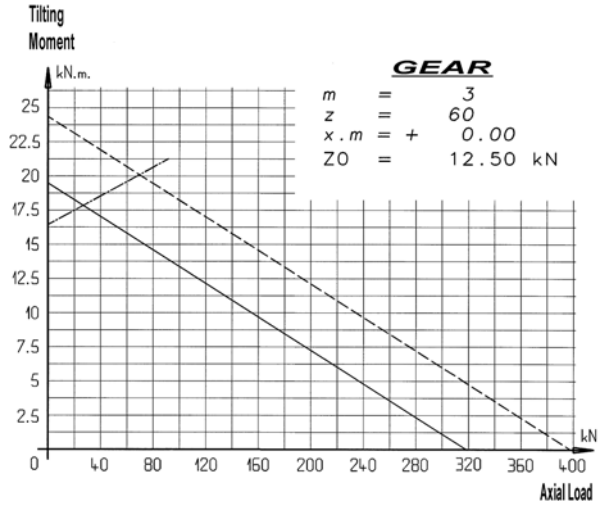
Estimated Weight: 716 kg

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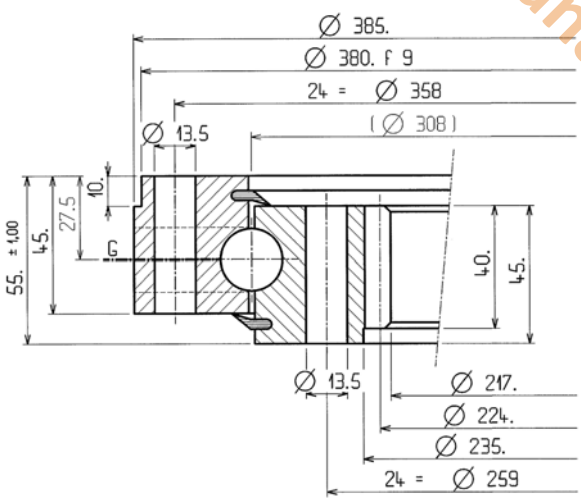
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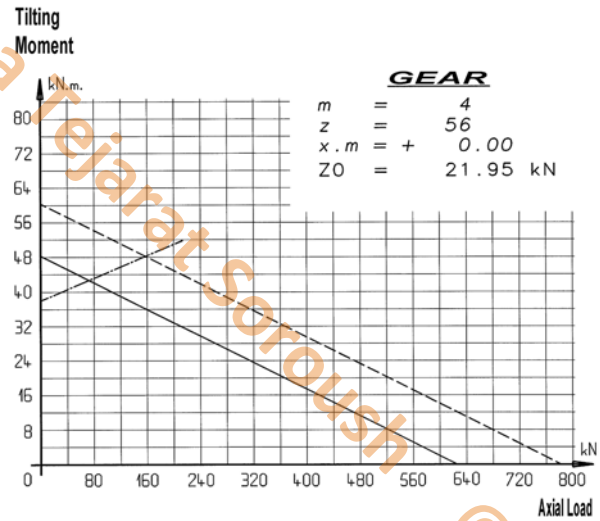




Estimated Weight: 10 kg

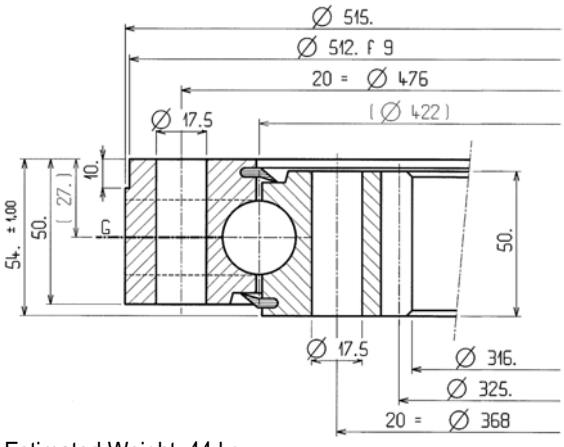
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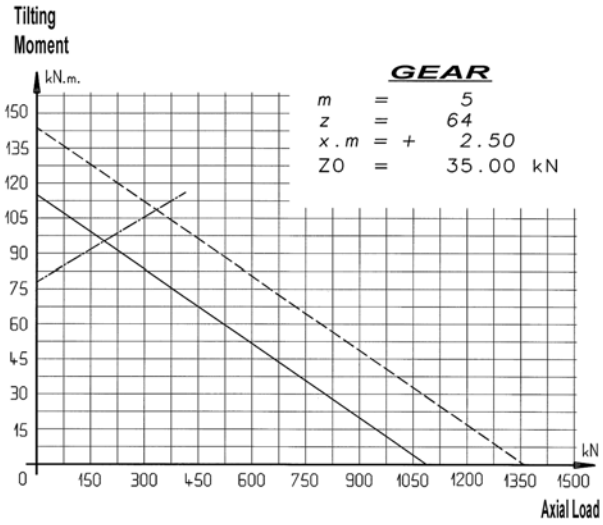




Estimated Weight: 24 kg

02.0308.01



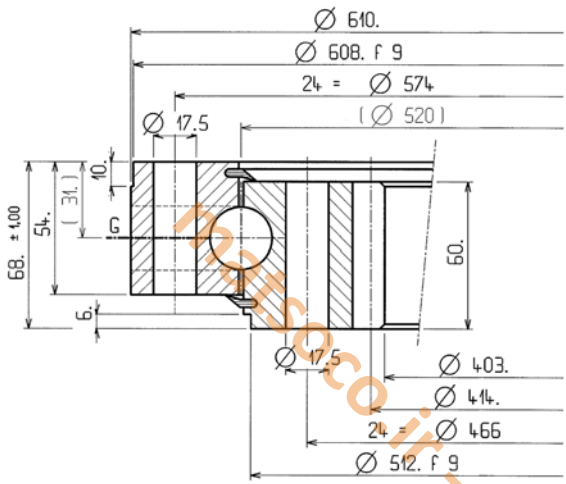


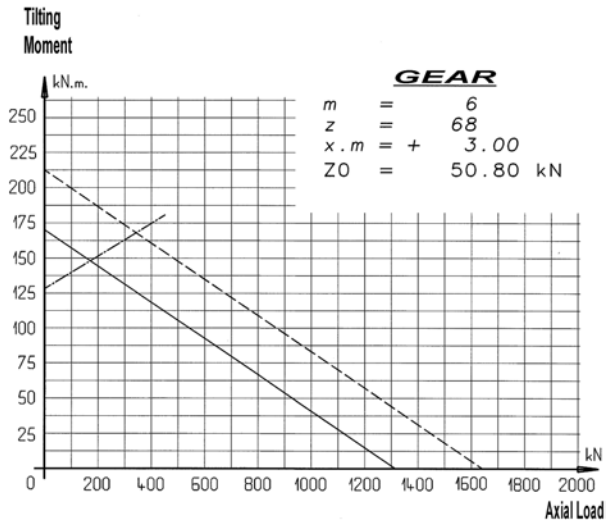
Estimated Weight: 44 kg

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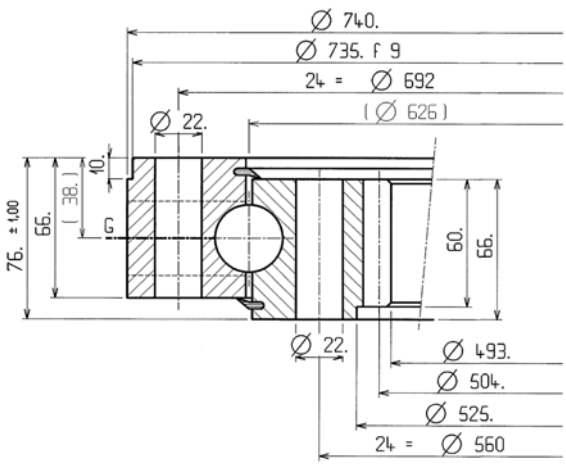
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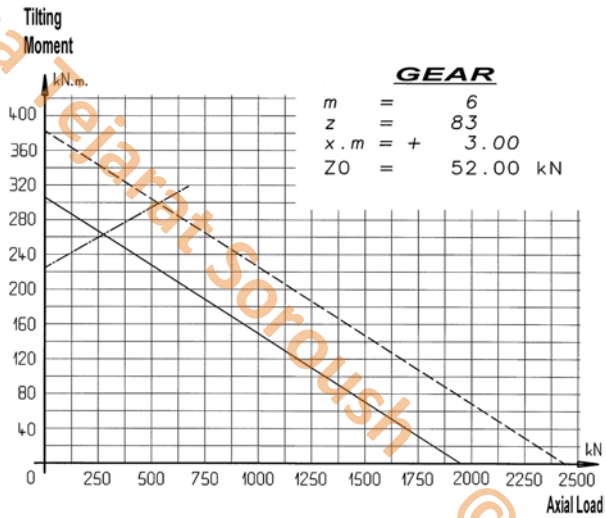




Estimated Weight: 63 kg

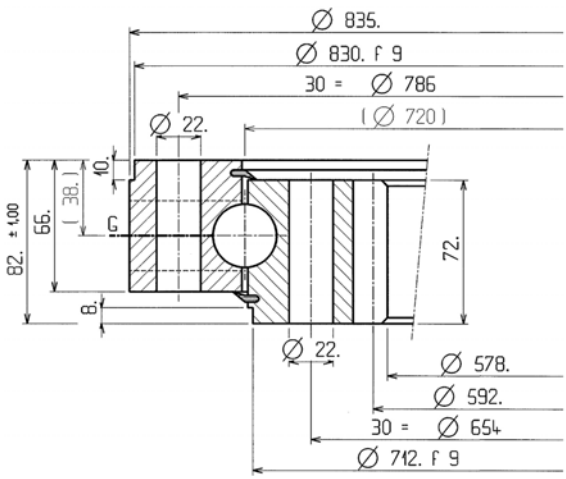
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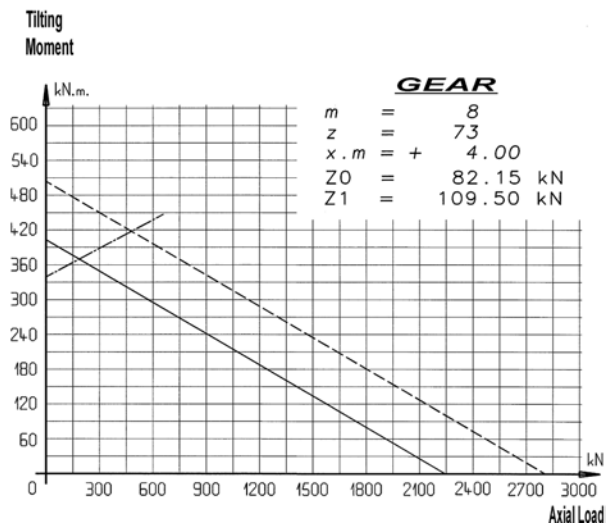




Estimated Weight: 105 kg

02.0720.02



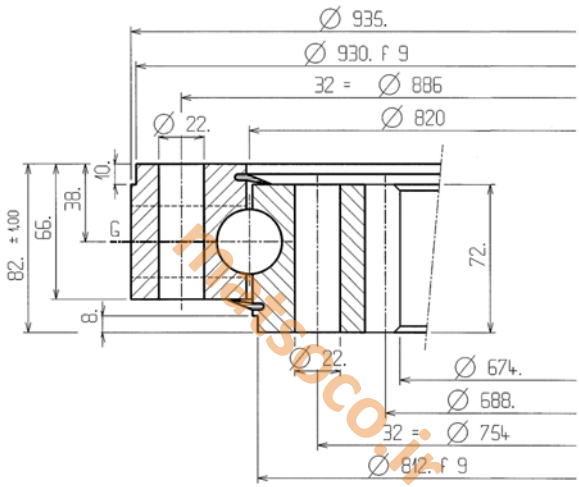


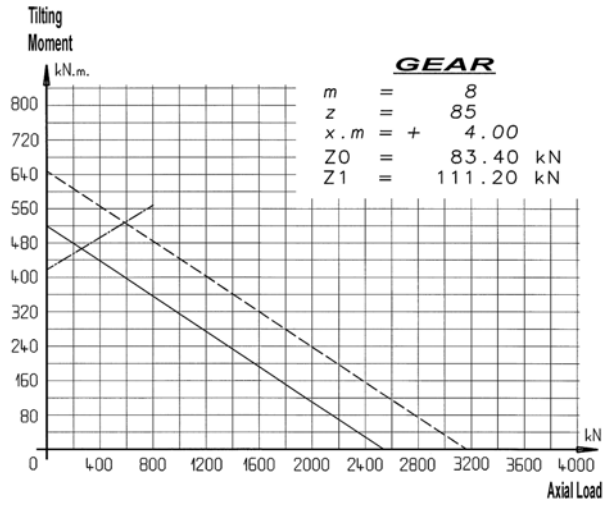
Estimated Weight: 130 kg

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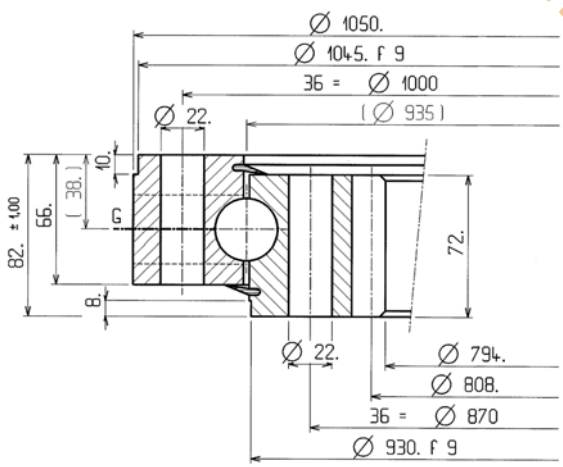
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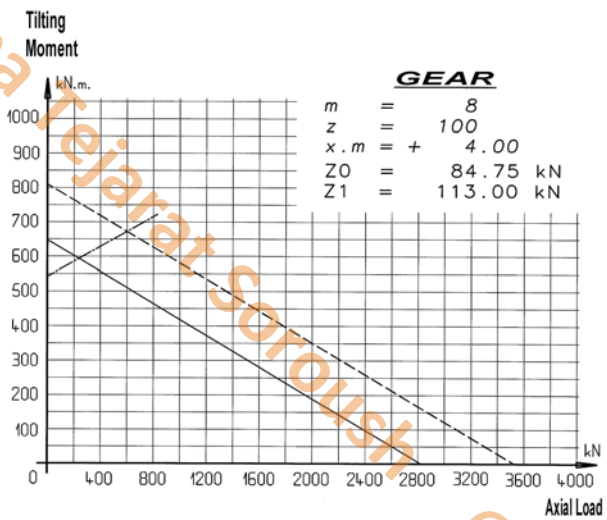




Estimated Weight: 150 kg

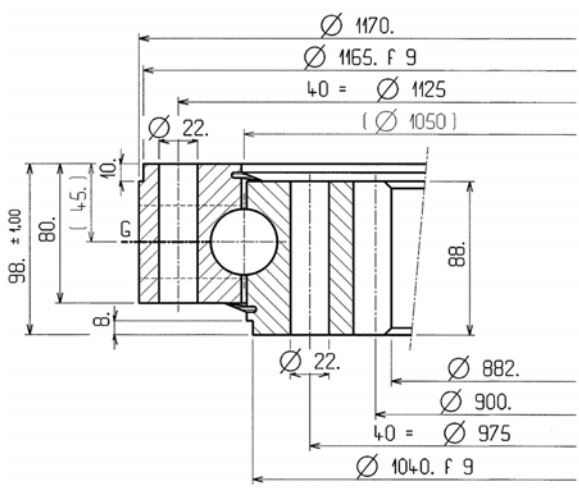
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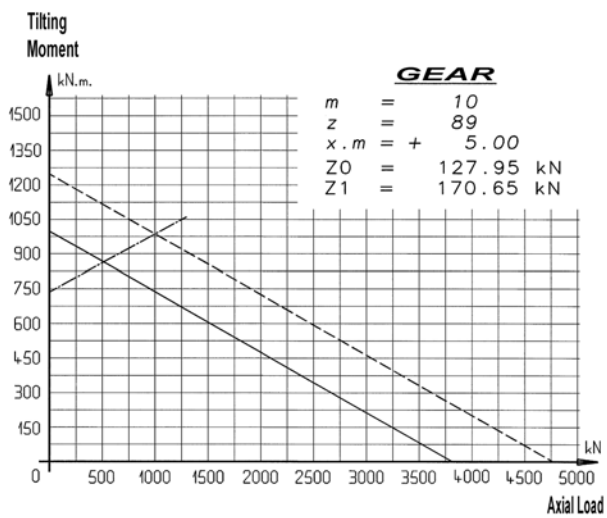




Estimated Weight: 168 kg

02.1050.00



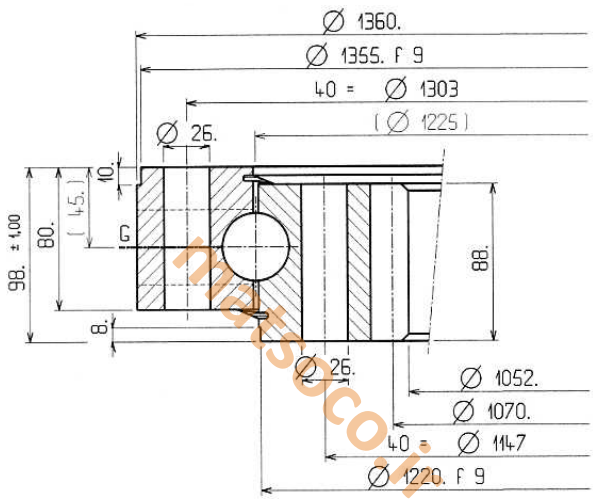


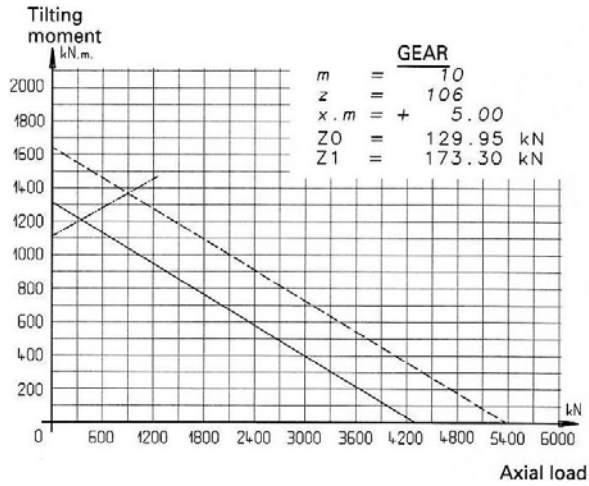
Estimated Weight: 258 kg

REFER TO PAGES 54 AND 55 FOR THE INTERPRETATION OF DRAWINGS AND CURVES

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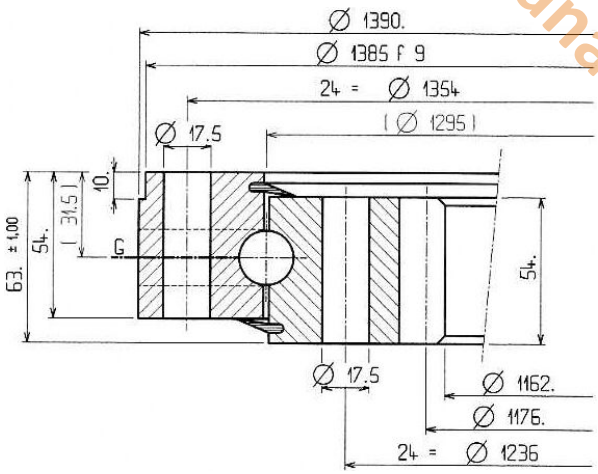
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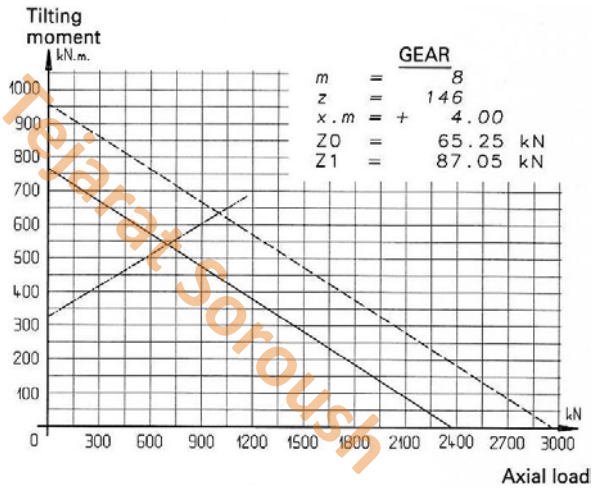




Estimated Weight: 321 kg

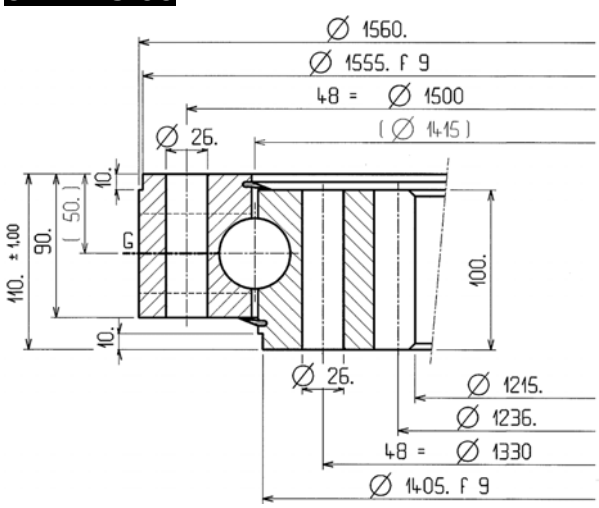
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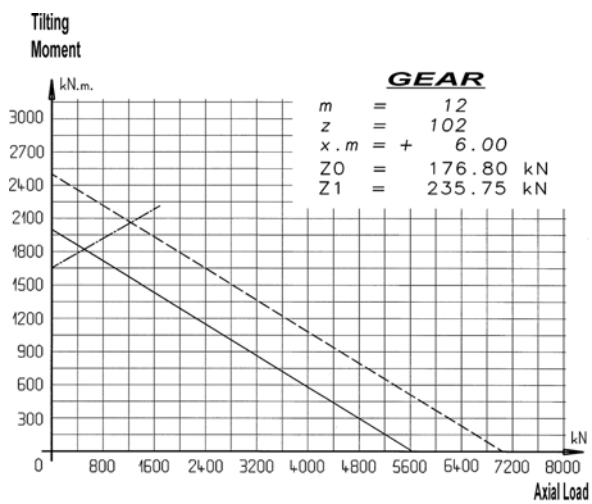




Estimated Weight: 171 kg

02.1415.00



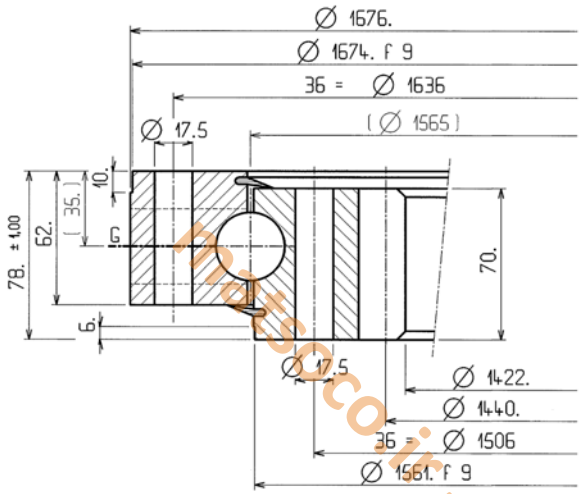


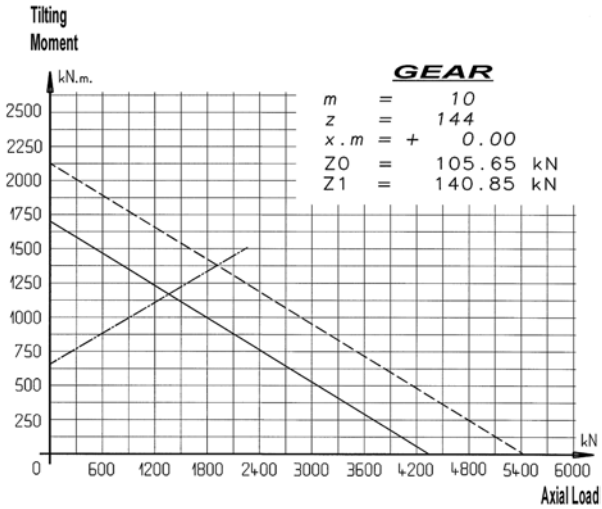
Estimated Weight: 471 kg

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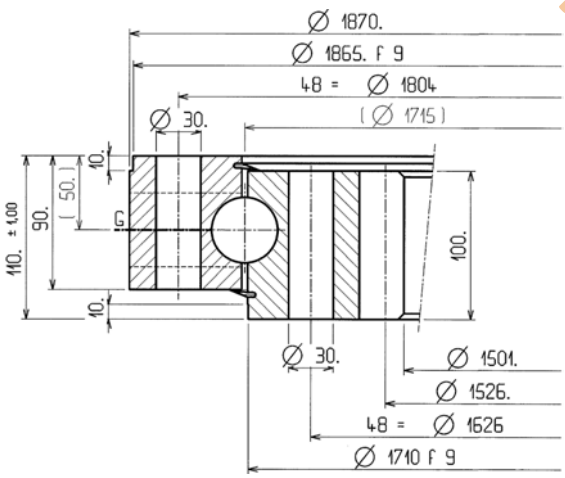
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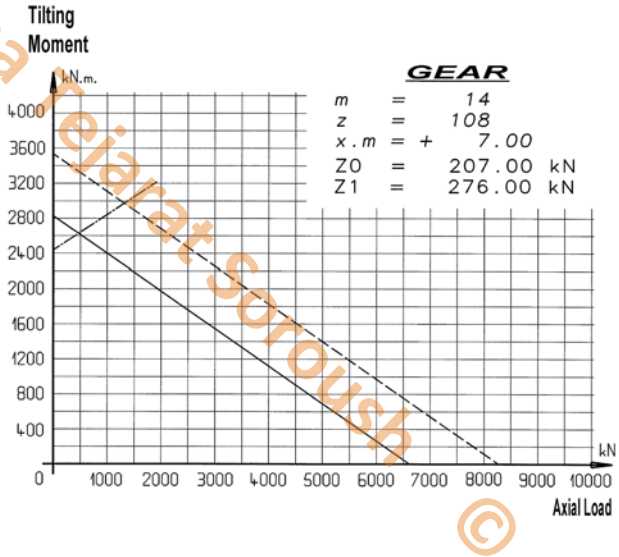




Estimated Weight: 278 kg

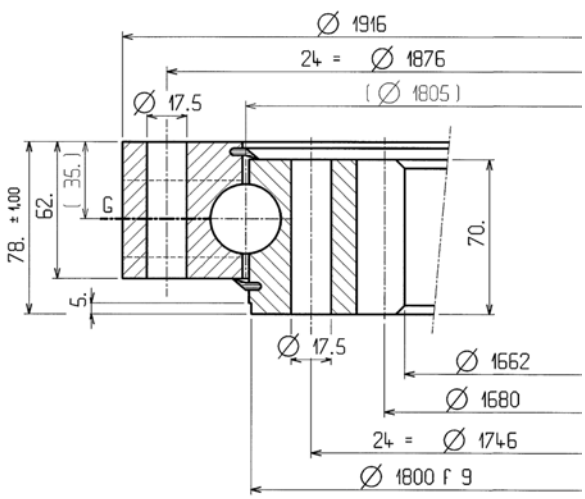
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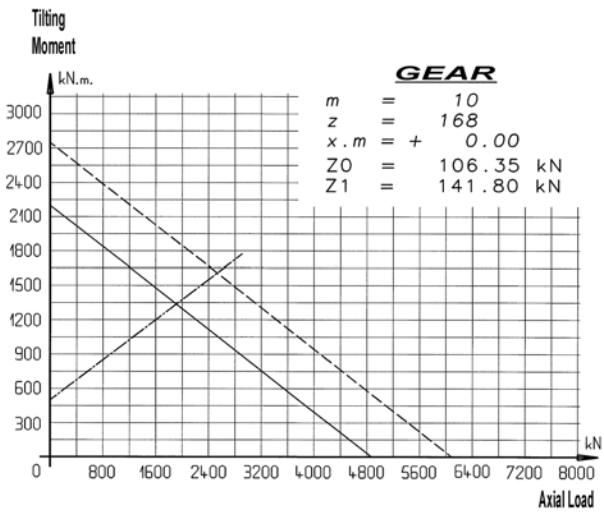




Estimated Weight: 607 kg

02.1805.02

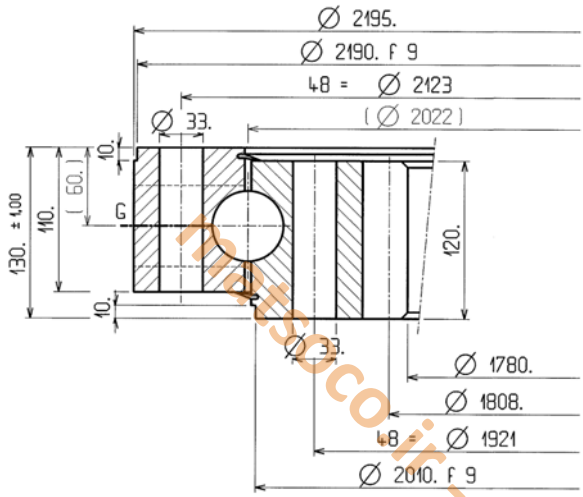


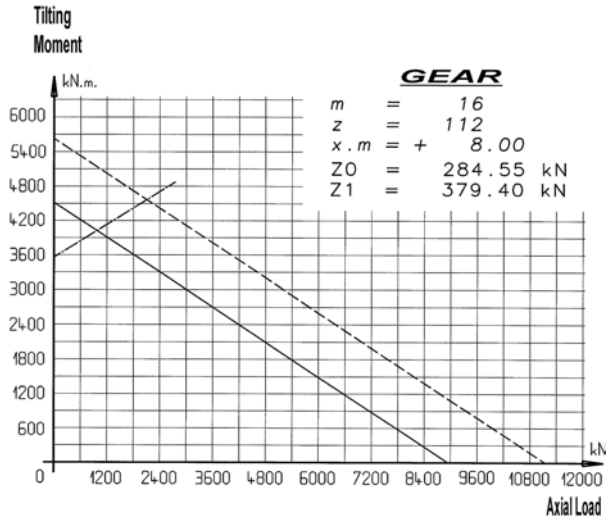


Estimated Weight: 324 kg

REFER TO PAGES 54 AND 55 FOR THE INTERPRETATION OF DRAWINGS AND CURVES

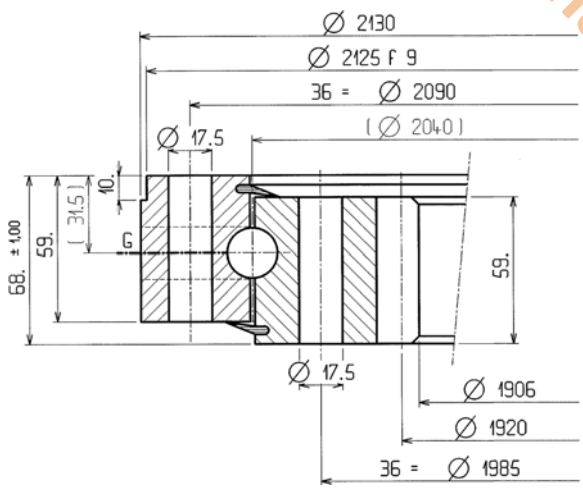
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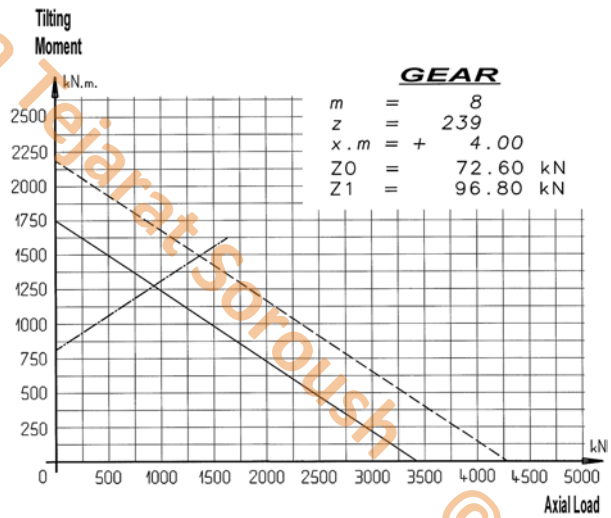




Estimated Weight: 979 kg

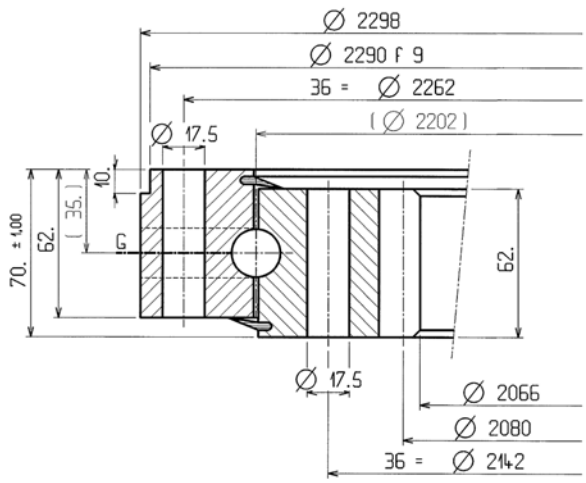
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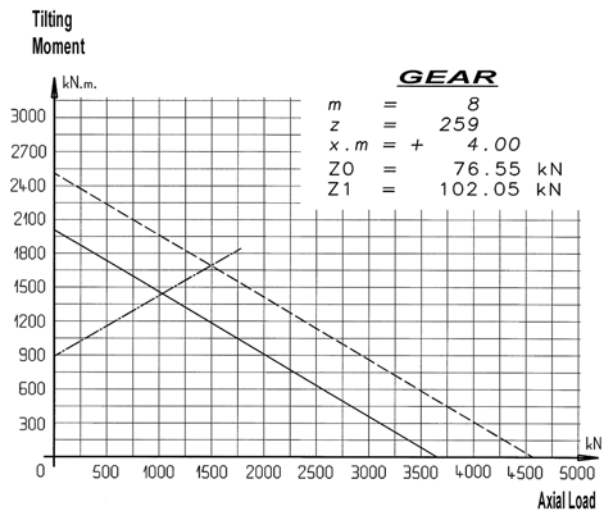




Estimated Weight: 290 kg

02.2202.00



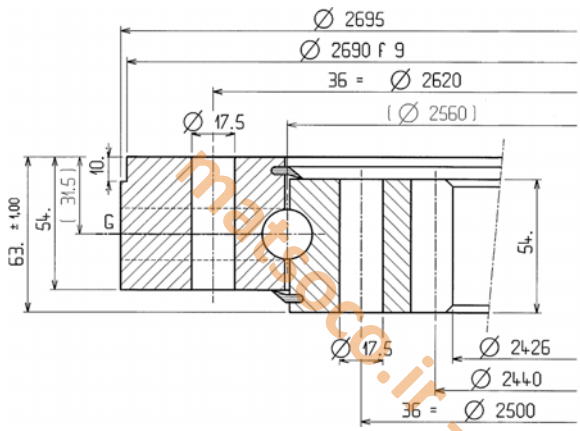


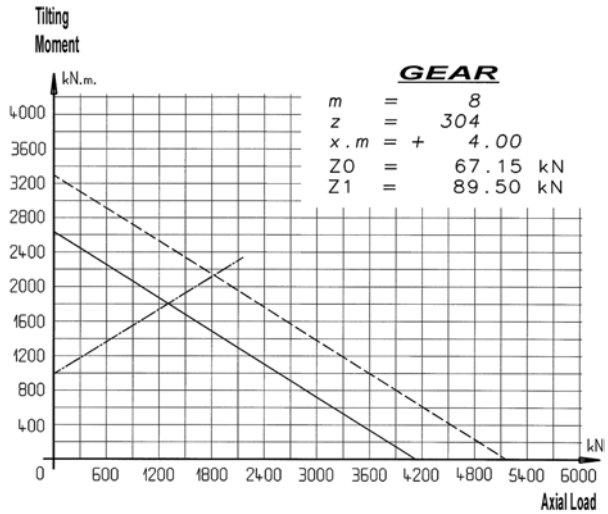
Estimated Weight: 343 kg

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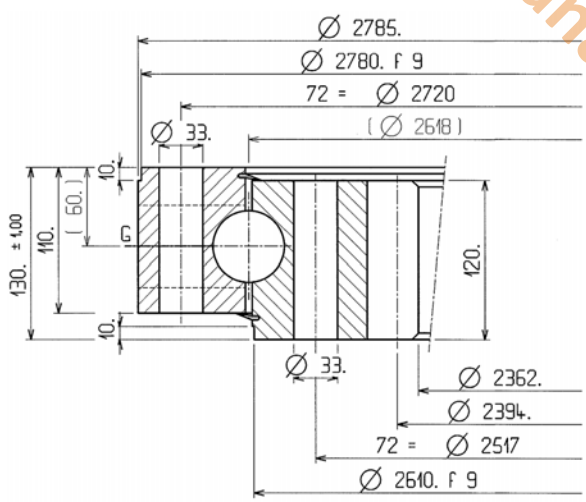
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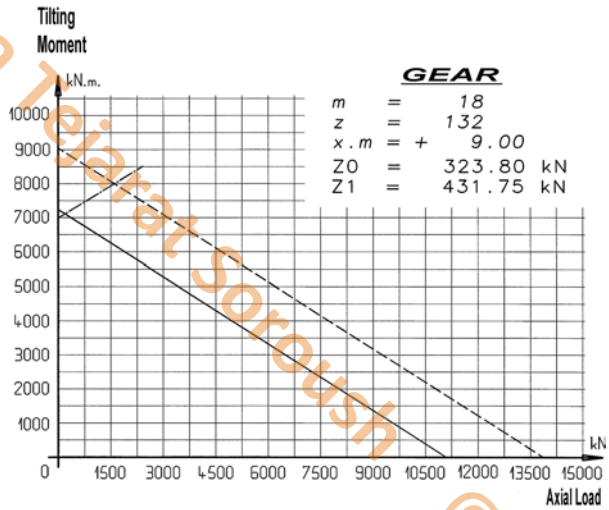




Estimated Weight: 414 kg

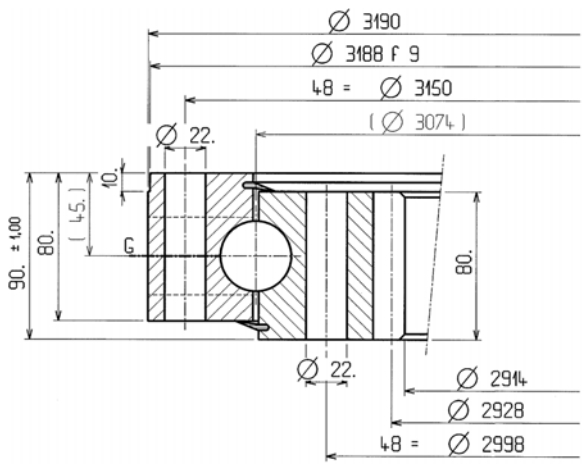
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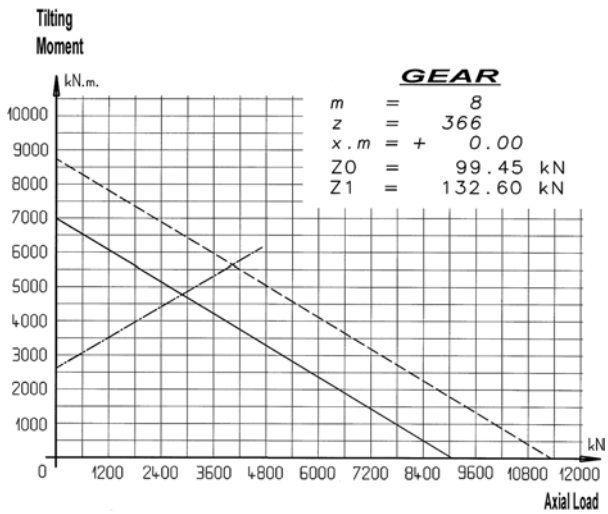




Estimated Weight: 1270 kg

02.3074.01



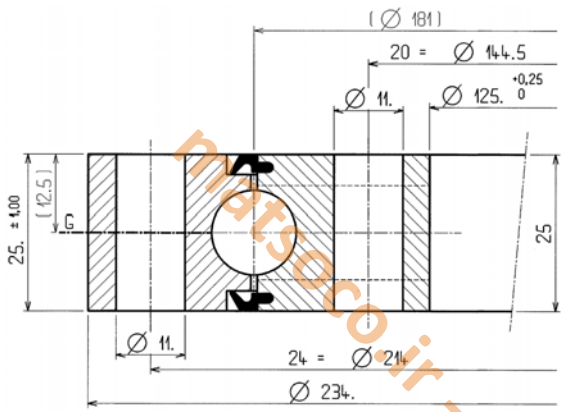


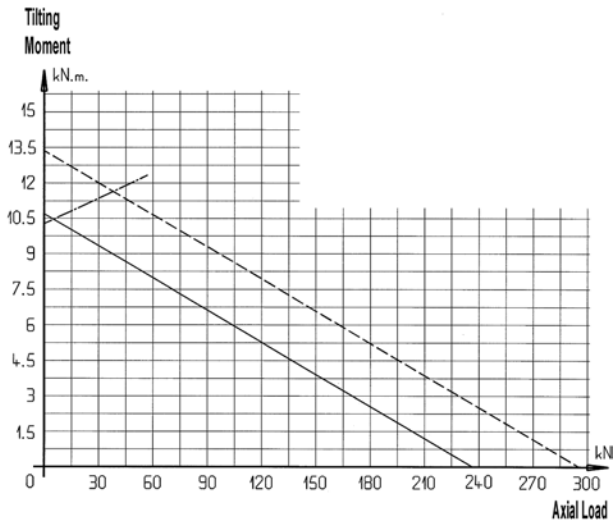
Estimated Weight: 735 kg

REFER TO PAGES 54 AND 55 FOR THE INTERPRETATION OF DRAWINGS AND CURVES

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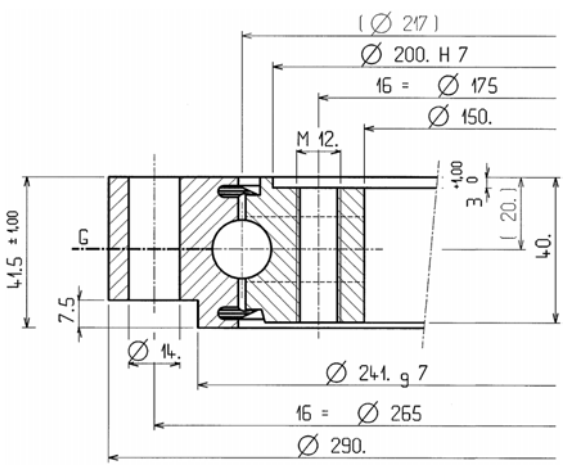
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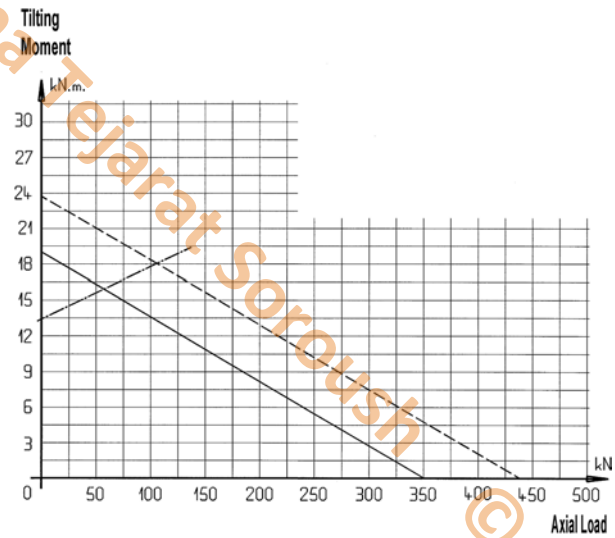




Estimated Weight: 5 kg

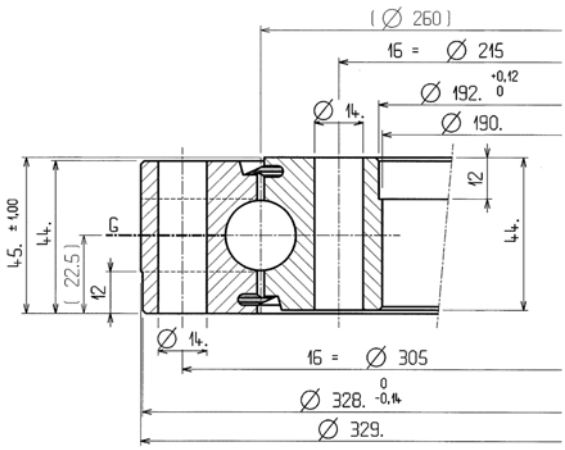
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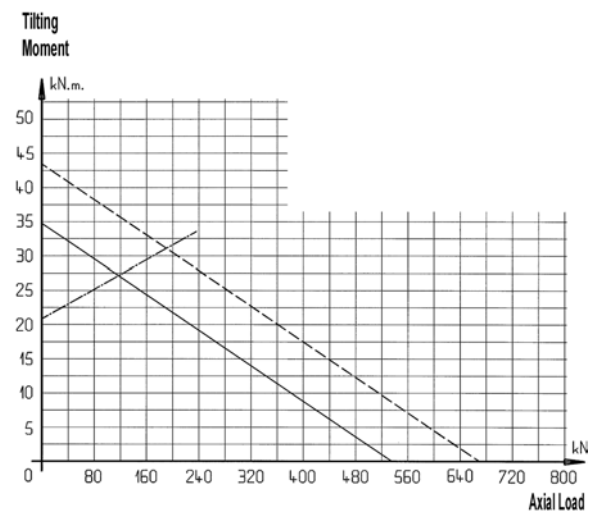




Estimated Weight: 14 kg

03.0260.00



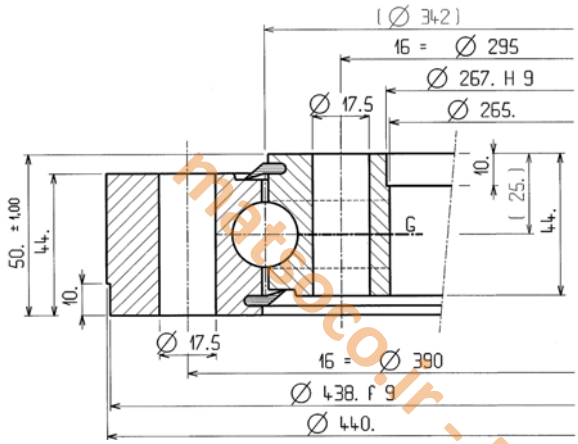


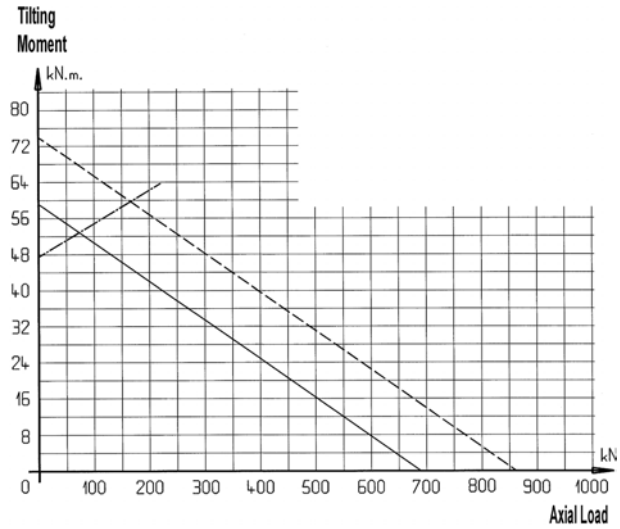
Estimated Weight: 17 kg

REFER TO PAGES 54 AND 55 FOR THE INTERPRETATION OF DRAWINGS AND CURVES

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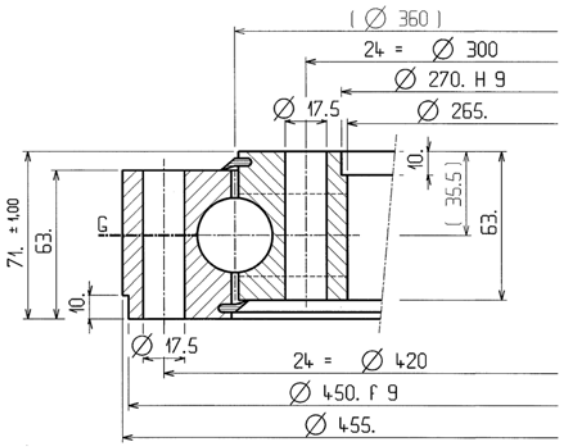
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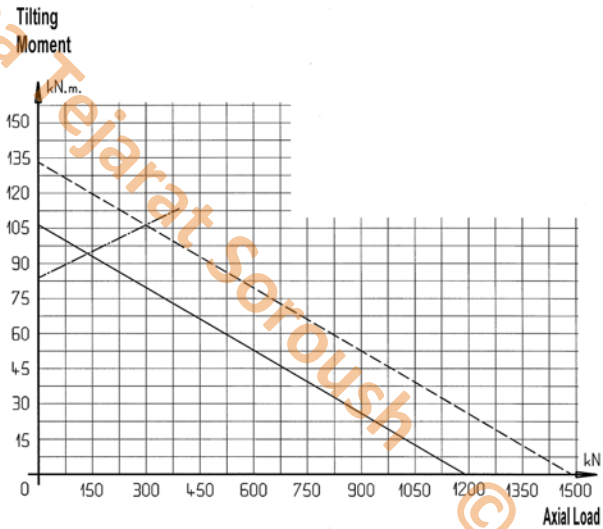




Estimated Weight: 29 kg

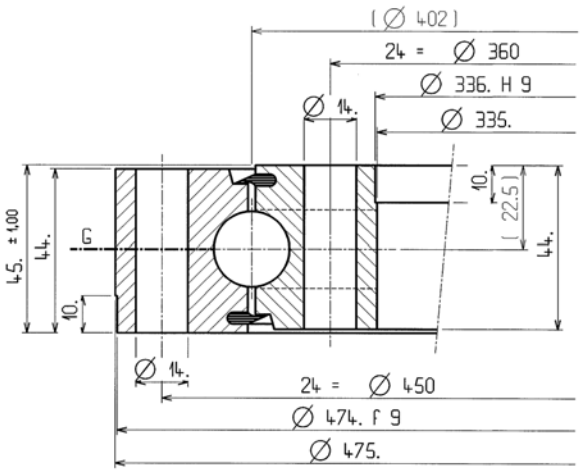
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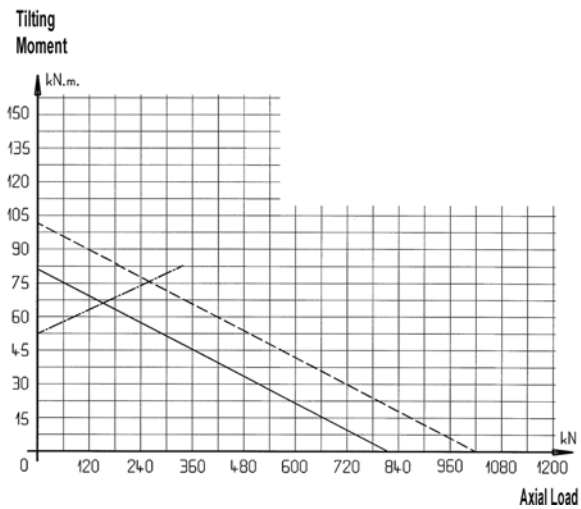




Estimated Weight: 45 kg

03.0402.00



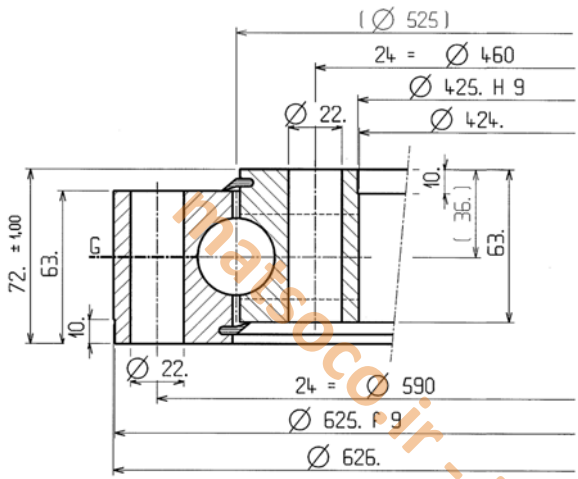


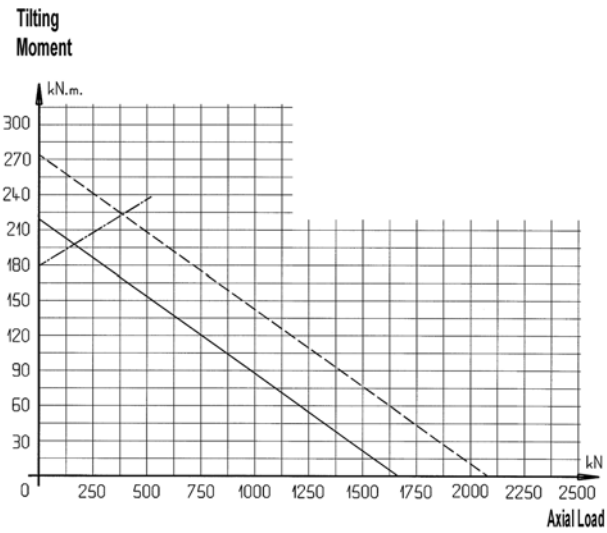
Estimated Weight: 30 kg

REFER TO PAGES 54 AND 55 FOR THE INTERPRETATION OF DRAWINGS AND CURVES

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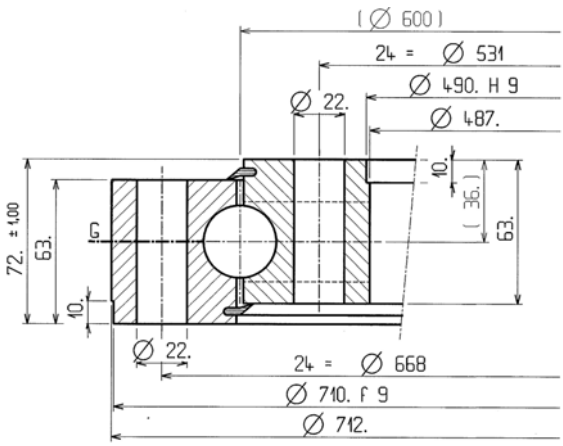
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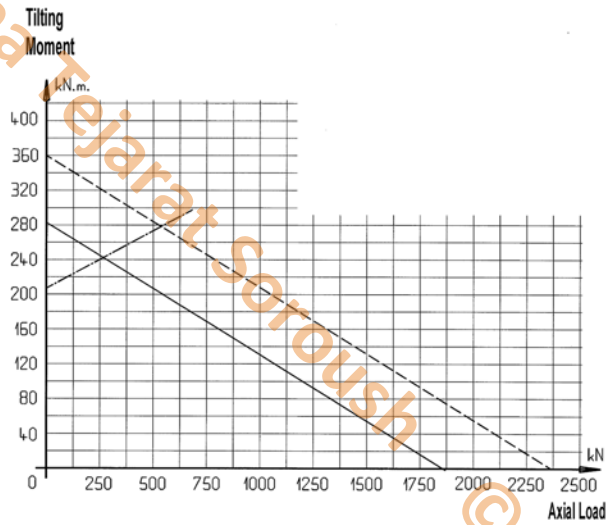




Estimated Weight: 70 kg

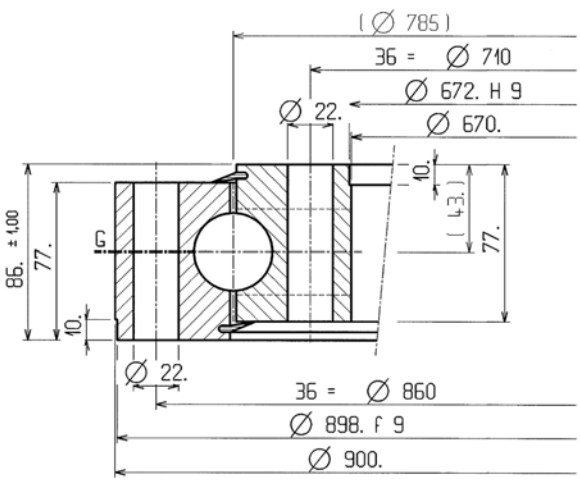
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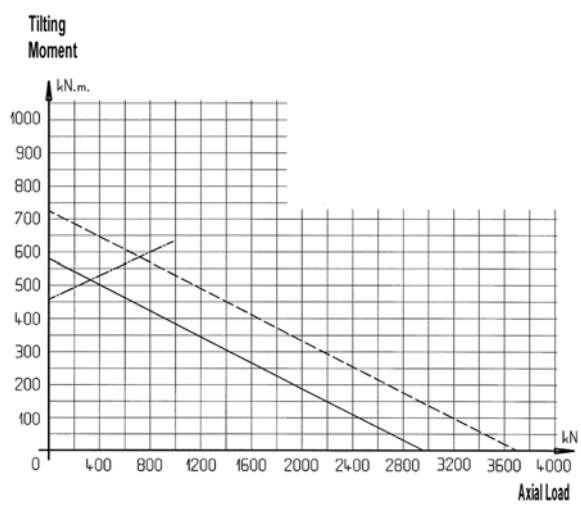




Estimated Weight: 91 kg

03.0785.00



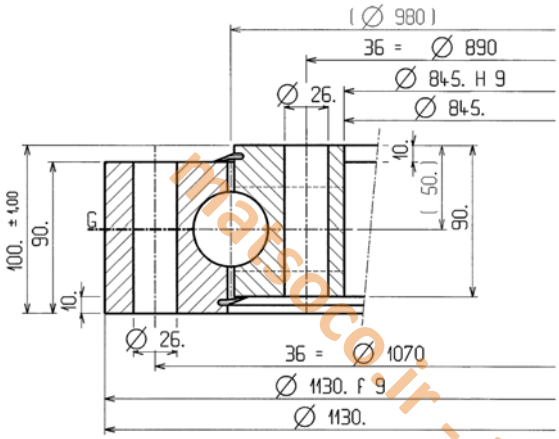


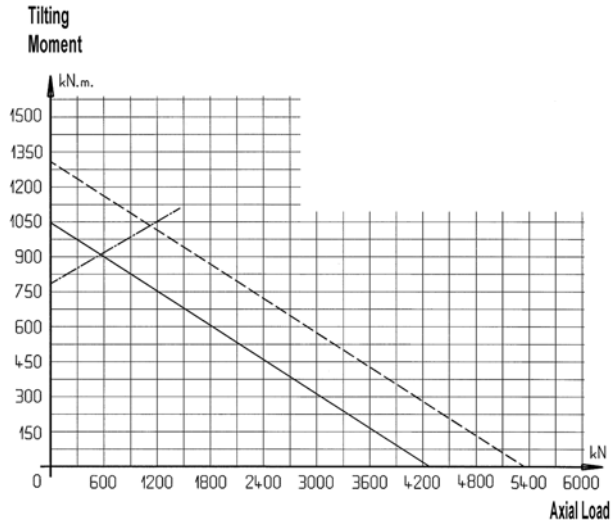
Estimated Weight: 148 kg

REFER TO PAGES 54 AND 55 FOR THE INTERPRETATION OF DRAWINGS AND CURVES

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03.0980.02





Estimated Weight: 271 kg

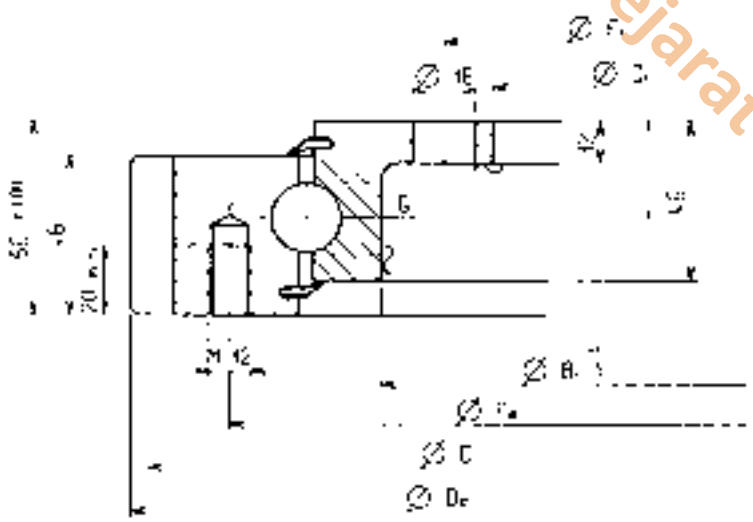
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REFER TO PAGES 54 AND 55 FOR THE INTERPRETATION OF DRAWINGS AND CURVES

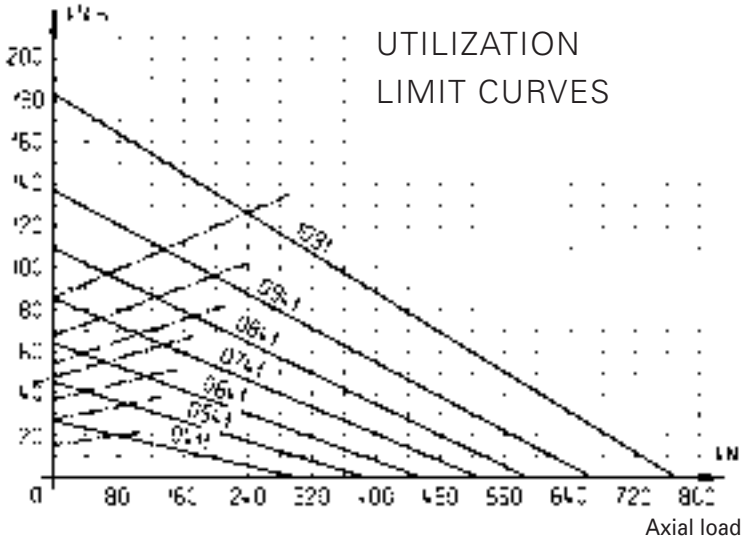
LIGHT SERIES BEARINGS

DRAWING AND CURVES - EXTERNAL GEAR

FAMILIES : 21 - 24 - 27



Tilting moment



The mounting holes are equispaced.

Ne : number of holes in the outer ring.
Ni : number of holes in the inner ring.

Tapping depth in the outer ring :
20 mm minimum.

G = 4 equispaced grease nipples
(M8 X 1.00) mounted on the inner ring.

Material : Improved XC 45, code Z.

These bearings are also available without drilling. The references are identical except for the last two digits :
00 : without bolt holes,
01 : standard drilling.

The values on "Light Series" capacity curves can be read directly ; you do not have to add any factors.

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LIGHT SERIES BEARINGS

REFERENCES - EXTERNAL GEAR

FAMILIES : 21 - 24 - 27

		MEASUREMENTS IN MILLIMETERS										
REFERENCES	WEIGHT Kg	DIMENSIONS De	Di	Bi	FASTENING Fe	Ne	Fi	Ni	GEARS m	z	D	Teeth resistance kN
21 0411 01	32	505	304	368	455	10	332	12	5	99	495	33,8
21 0541 01	44	640	434	498	585	14	462	14	6	105	630	41
21 0641 01	52	742	534	598	685	16	562	16	6	122	732	41
21 0741 01	60	840	634	698	785	18	662	16	6	138	828	41
21 0841 01	68	950	734	798	885	18	762	18	8	117	936	55
21 0941 01	76	1046	834	898	985	20	862	20	8	129	1032	55
21 1091 01	86	1198	984	1048	1135	22	1012	20	8	148	1184	55

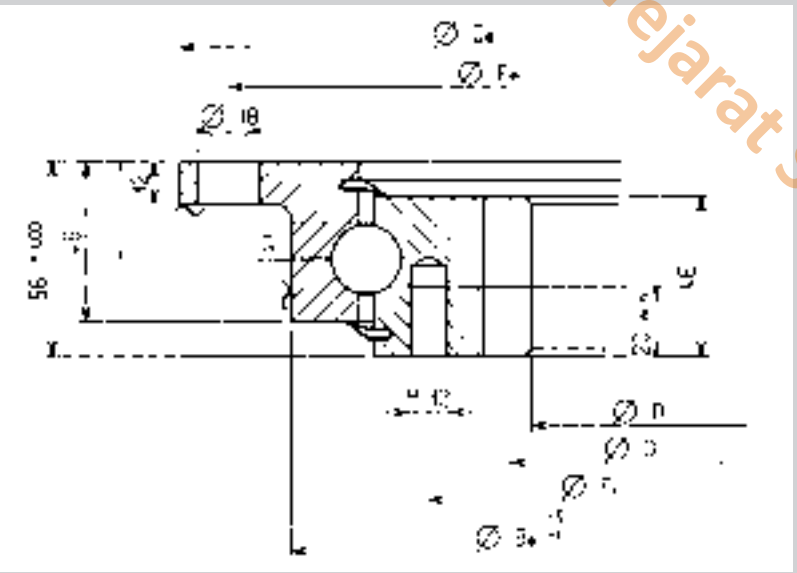
Families 21 : class I 24 : class III 27 : class V have all the same geometry

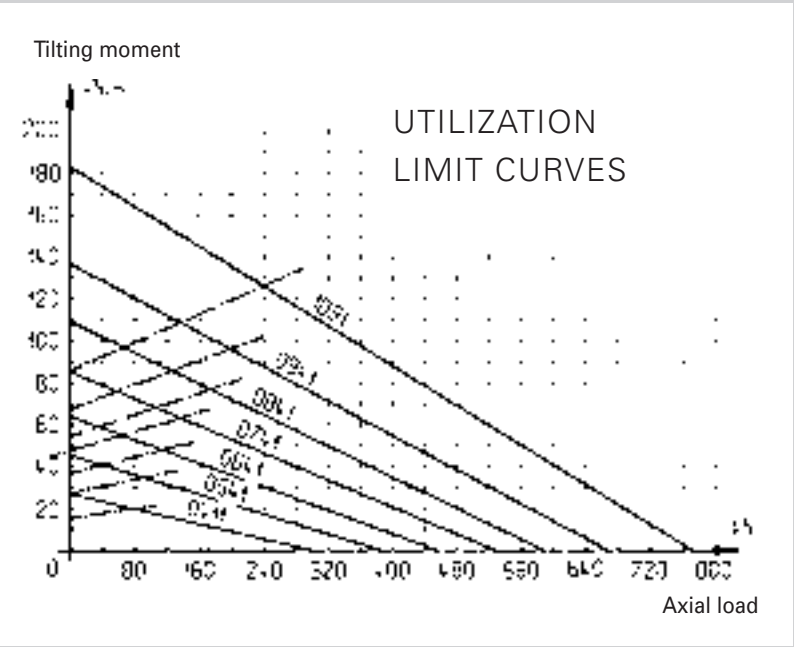
The characteristics of these classes are tabulated on the table page 106.
Please consult us, for the class suitable for your application.

LIGHT SERIES BEARINGS

DRAWING AND CURVES - INTERNAL GEAR

FAMILIES : 22 - 25 - 28





The mounting holes are equispaced.

Ne : number of holes in the outer ring.
Ni : number of holes in the inner ring.

Tapping depth in the inner ring :
20 mm minimum.

G = 4 equispaced grease nipples
(M8 X 1.00) mounted on the outer ring.

Material : Improved XC 45, code Z.

These bearings are also available without drilling. The references are identical except for the last two digits :
00 : without bolt holes,
01 : standard drilling.

The values on "Light Series" capacity curves can be read directly ; you do not have to add any factors.

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LIGHT SERIES BEARINGS

REFERENCES - INTERNAL GEAR

FAMILIES : 22 - 25 - 28

		MEASUREMENTS IN MILLIMETERS										
REFERENCES	WEIGHT Kg	DIMENSIONS De	Di	Be	FASTENING Fe	Ne	Fi	Ni	GEARS m	z	D	Teeth Resistance kN
22 0411 01	31	518	325	454	490	8	375	12	5	67	335	32,4
22 0541 01	41	648	445	584	620	10	505	16	6	76	456	40,3
22 0641 01	48	748	546	684	720	12	605	18	6	93	558	40,3
22 0741 01	55	848	649	784	820	12	705	20	6	110	660	40,3
22 0841 01	63	948	736	884	920	14	805	20	8	94	752	54,3
22 0941 01	71	1048	840	984	1020	16	905	22	8	107	856	54,3
22 1091 01	80	1198	986	1134	1170	16	1055	24	8	125	1000	54,3

Families 22 : classel 25 : class III 28 : class V have all the same geometry.

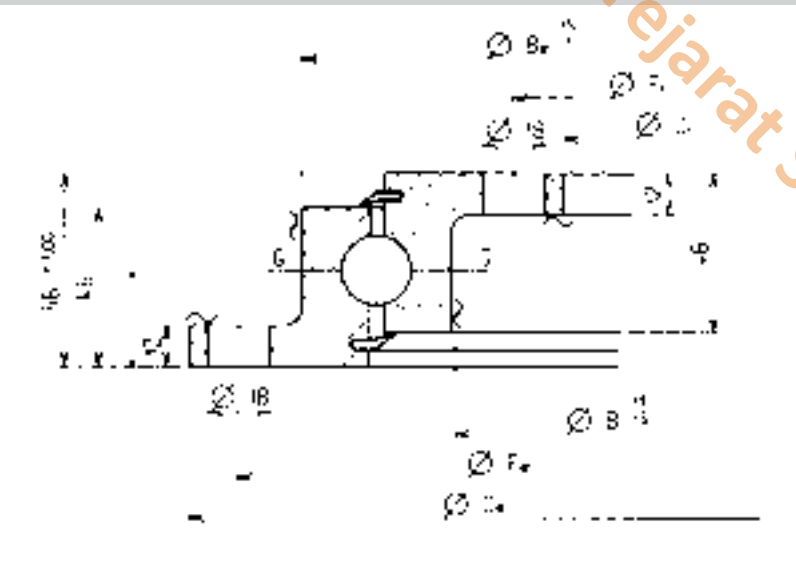
The characteristics of these classes are tabulated on the table page 106.
Please consult us, for the class suitable for your application.

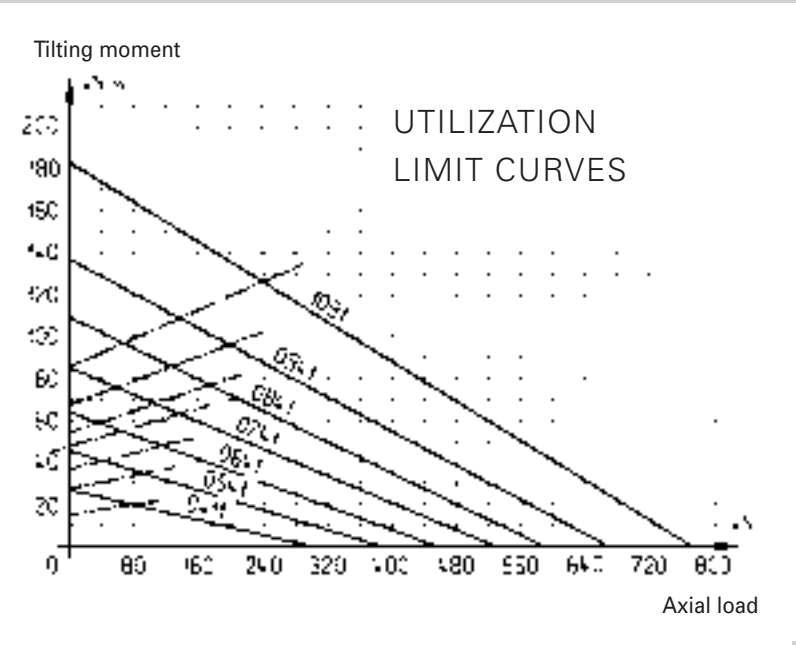
21 to 29

LIGHT SERIES BEARINGS

DRAWING AND CURVES - WITHOUT GEAR

FAMILIES : 23 - 26 - 29





The mounting holes are equispaced.

Ne : number of holes in the outer ring.
Ni : number of holes in the inner ring.

G = 4 equispaced grease nipples (M8 X 1.00) mounted on each ring.

Material : Improved XC 45, code Z.

These bearings are also available without drilling. The references are identical except for the last two digits :
00 : without bolt holes,
01 : standard drilling.

The values on "Light Series" capacity curves can be read directly ; you do not have to add any factors.

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LIGHT SERIES BEARINGS

REFERENCES - WITHOUT GEAR

FAMILIES : 23 - 26 - 29

		MEASUREMENTS IN MILLIMETERS							
REFERENCES	WEIGHT Kg	DIMENSIONS De	Di	Be	Bi	FASTENING Fe	Ne	Fi	Ni
23 0411 01	23	518	304	454	368	490	8	332	12
23 0541 01	34	648	434	584	498	620	10	462	14
23 0641 01	40	748	534	684	598	720	12	562	16
23 0741 01	46	848	634	784	698	820	12	662	16
23 0841 01	52	948	734	884	798	920	14	762	18
23 0941 01	58	1048	834	984	898	1020	16	862	20
23 1091 01	67	1198	984	1134	1048	1170	16	1012	20

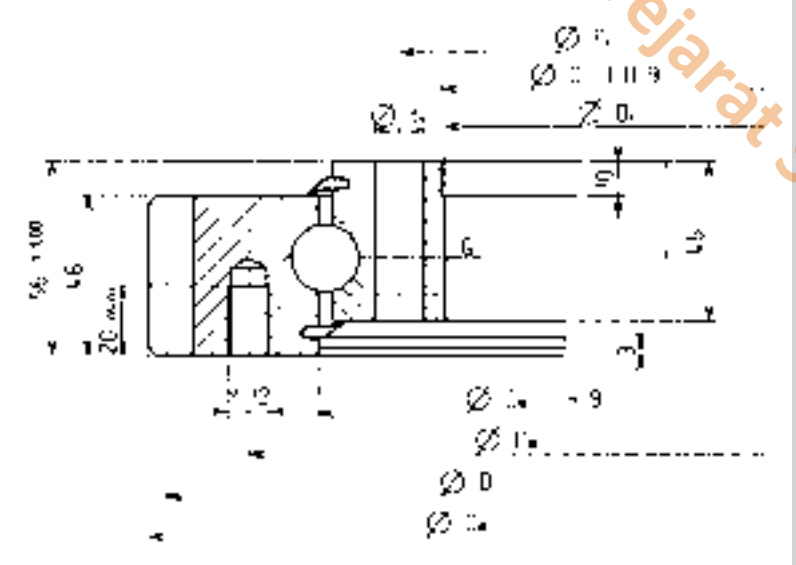
Families 23 : class I 26 : class III 29 : class V have all the same geometry.

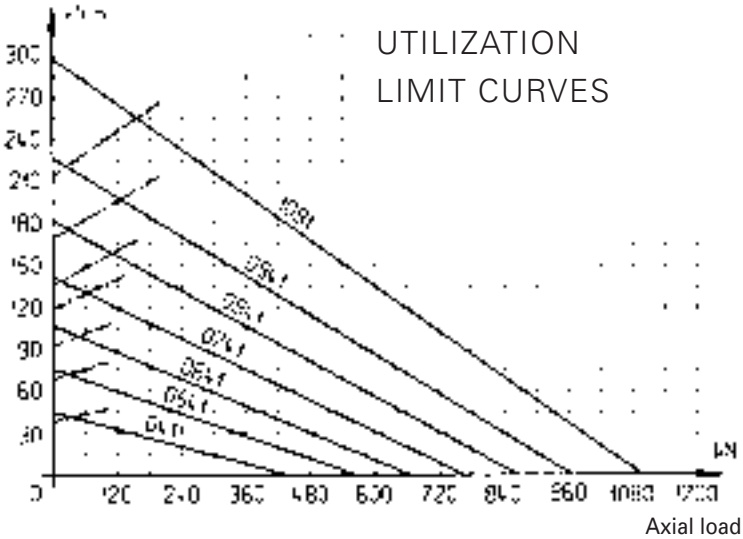
The characteristics of these classes are tabulated on the table page 106.
Please consult us, for the class suitable for your application.

LIGHT SERIES SOLID SECTIONS BEARINGS

DRAWING AND CURVES - EXTERNAL GEAR

FAMILIES : 31 - 34 - 37





The mounting holes are equispaced.

Ne : number of holes in the outer ring.
Ni : number of holes in the inner ring.

Tapping depth in the outer ring :
20 mm minimum.

G = 4 equispaced grease nipples
(M8 X 1.00) mounted on the inner ring.

Material : Improved XC 45, code Z.

Pilot Ce : height 3 mm, quality H9.
Pilot Ci : height 10 mm, quality H9.

These bearings are also available with through holes. The references are identical except for the last two digits :
01 : through holes inner ring,
11 : through holes outer ring.

The values on "Light Series" capacity curves can be read directly ; you do not have to add any factors.

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LIGHT SERIES SOLID SECTIONS BEARINGS

REFERENCES - EXTERNAL GEAR

FAMILIES : 31 - 34 - 37

		MEASUREMENTS IN MILLIMETERS											
REFERENCES	WEIGHT Kg	DIMENSIONS De	Di	Ce	Ci	FASTENING Fe	Ne	Fi	Ni	GEARS m	z	D	Teeth Resistance kN
31 0411 01	32	505	342	412,2	344	455	20	368	24	5	99	495	33,8
31 0541 01	46	640	472	542,5	474	585	28	498	32	6	105	630	41
31 0641 01	55	742	572	642	574	685	32	598	36	6	122	732	41
31 0741 01	62	840	672	743	674	785	36	698	40	6	138	828	41
31 0841 01	71	950	772	842	774	885	36	798	40	8	117	936	55
31 0941 01	78	1046	872	943	874	985	40	898	44	8	129	1032	55
31 1091 01	91	1198	1022	1094	1024	1135	44	1048	48	8	148	1184	55

Families 31 : class I 34 : class III 37 : class V have all the same geometry.

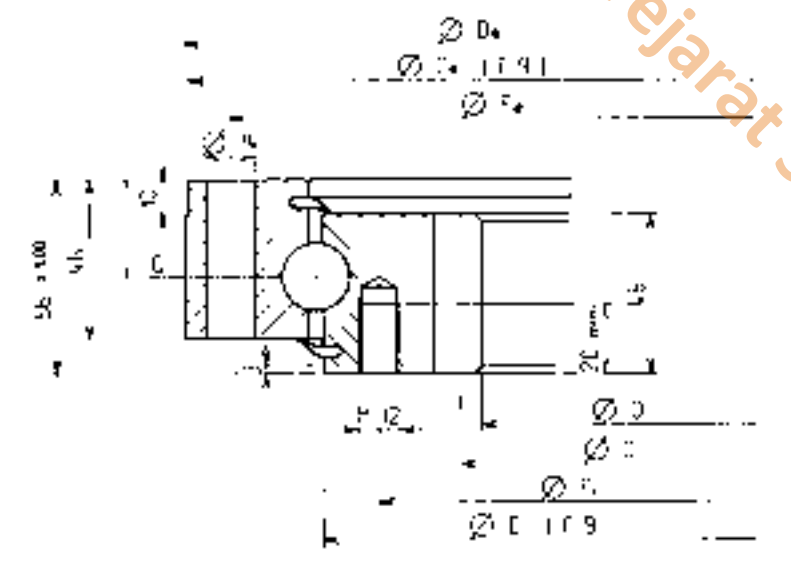
The characteristics of these classes are tabulated on the table page 106.
Please consult us, for the class suitable for your application.

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LIGHT SERIES SOLID SECTIONS BEARINGS

DRAWING AND CURVES - INTERNAL GEAR

FAMILIES : 32 - 35 - 38



The mounting holes are equispaced.

Ne : number of holes in the outer ring.
Ni : number of holes in the inner ring.

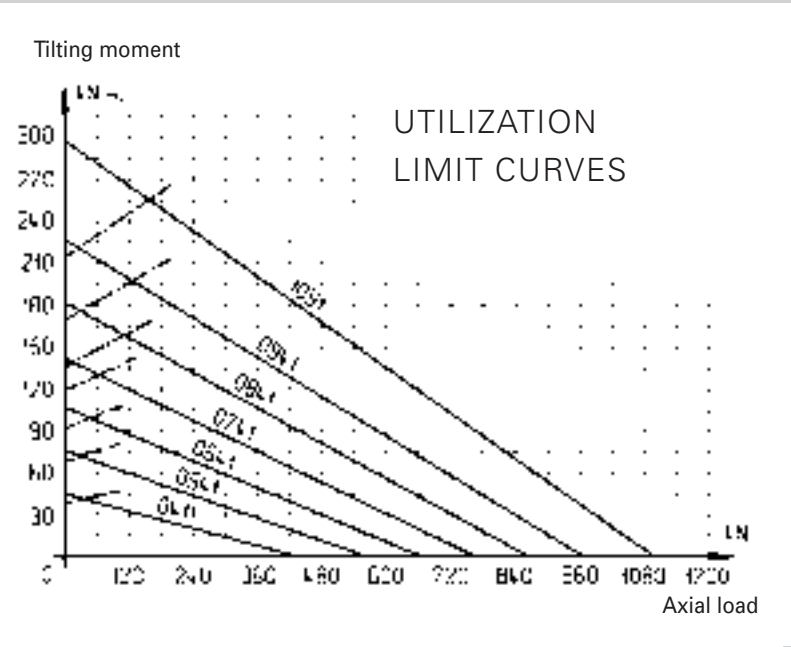
Tapping depth in the inner ring :
20 mm minimum.

G = 4 equispaced grease nipples
(M8 X 1.00) mounted on the outer ring.

Material : Improved XC 45, code Z.

Spigot Ce : height 10 mm, quality f9.
Spigot Ci : height 3 mm, quality f9.

The values on "Light Series" capacity curves can be read directly ; you do not have to add any factors.



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LIGHT SERIES SOLID SECTIONS BEARINGS

REFERENCES - INTERNAL GEAR

FAMILIES : 32 - 35 - 38

		MEASUREMENTS IN MILLIMETERS											
REFERENCES	WEIGHT Kg	DIMENSIONS De	Di	Ce	Ci	FASTENING Fe	Ne	Fi	Ni	GEARS m	z	D	Teeth Resistance kN
32 0411 01	31	486	325	484	409,5	460	24	375	24	5	67	335	32,4
32 0541 01	43	616	445	614	539,5	590	32	505	32	6	76	456	40,3
32 0641 01	51	716	546	714	639	690	36	605	36	6	93	558	40,3
32 0741 01	58	816	649	814	739,7	790	40	705	40	6	110	660	40,3
32 0841 01	70	916	736	914	840	890	40	805	40	8	94	752	54,3
32 0941 01	76	1016	840	1014	939	990	44	905	44	8	107	856	54,3
32 1091 01	92	1166	986	1164	1089	1140	48	1055	48	8	125	1000	54,3

Families 32 : class I 35 : class III 38 : class V have all the same geometry.

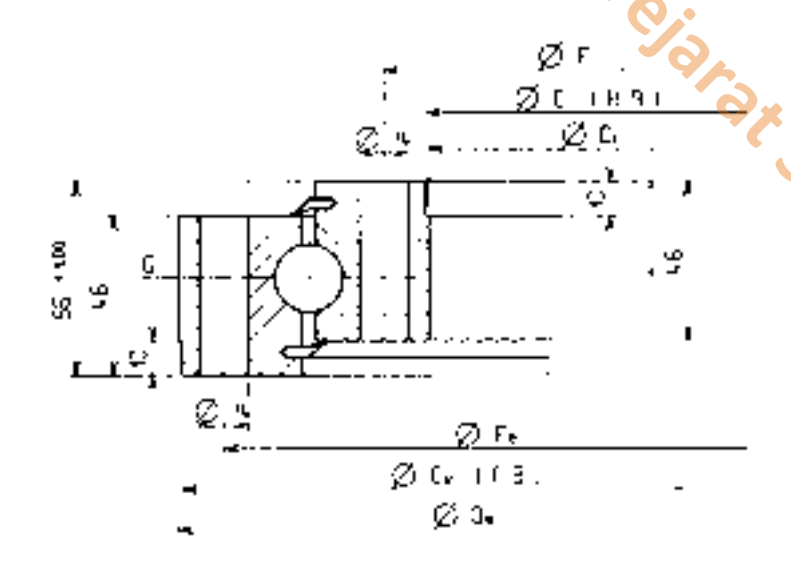
The characteristics of these classes are tabulated on the table page 106.
Please consult us, for the class suitable for your application.

4
31 to 39

LIGHT SERIES SOLID SECTIONS BEARINGS

DRAWING AND CURVES - WITHOUT GEAR

FAMILIES : 33 - 36 - 39



The mounting holes are equispaced.

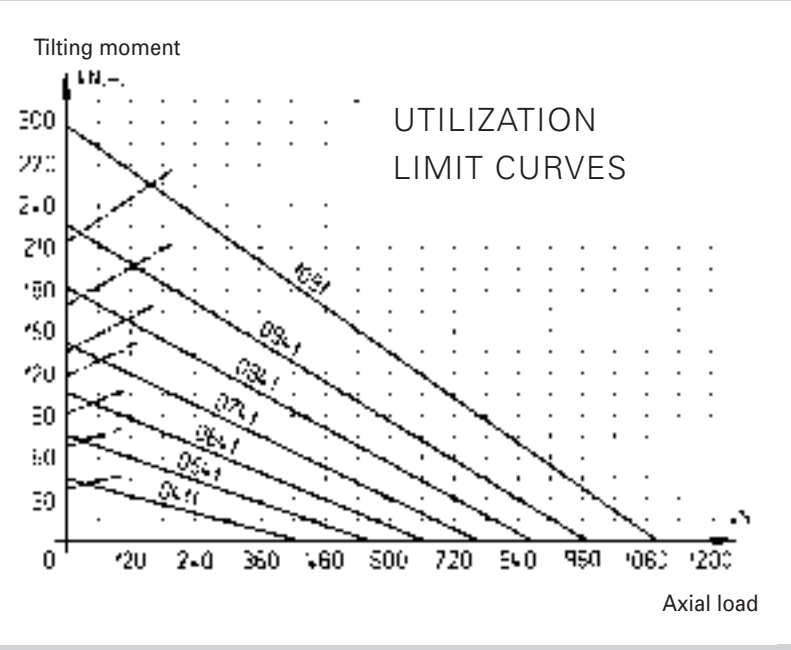
Ne : number of holes in the outer ring.
Ni : number of holes in the inner ring.

G = 4 equispaced grease nipples (M8 X 1.00) mounted on the outer ring.

Material : Improved XC 45, code Z.

Spigot Ce : height 10 mm, quality f9.
Pilot Ci : height 10 mm, quality H9.

The values on "Light Series" capacity curves can be read directly ; you do not have to add any factors.



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LIGHT SERIES SOLID SECTIONS BEARINGS

REFERENCES - WITHOUT GEAR

FAMILIES : 33 - 36 - 39

REFERENCES	WEIGHT Kg	MEASUREMENTS IN MILLIMETERS							
		DIMENSIONS				FASTENING			
		De	Di	Ce	Ci	Fe	Ne	Fi	Ni
33 0411 01	29	486	342	484	344	460	24	368	24
33 0541 01	38	616	472	614	474	590	32	498	32
33 0641 01	45	716	572	714	574	690	36	598	36
33 0741 01	52	816	672	814	674	790	40	698	40
33 0841 01	60	916	772	914	774	890	40	798	40
33 0941 01	67	1016	872	1014	874	990	44	898	44
33 1091 01	78	1166	1022	1164	1024	1140	48	1048	48

Families 33 : class I 36 : class III 39 : class V have all the same geometry.

The characteristics of these classes are tabulated on the table page 106.
Please consult us, for the class suitable for your application.

LIGHT SERIES AND SOLID SECTIONS

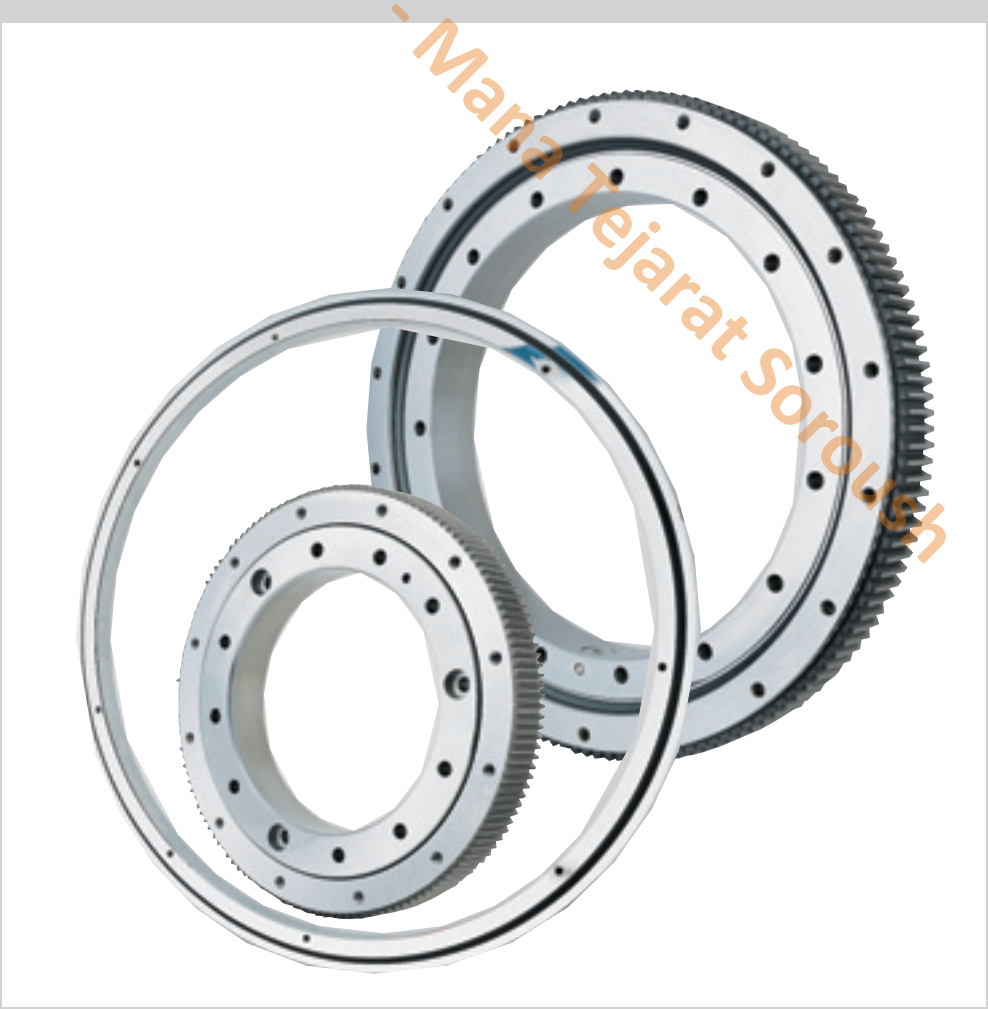
TABLE OF DEFLECTION UNDER MASTER LOAD

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		MEASUREMENTS IN MILLIMETERS					
RACEWAY MEAN DIAM. (mm)	MASTER LOAD (N)	MAXIMUM DEFLECTION (average 3 points)			MAXIMUM MEASUREMENT IN 1 POINT		
		Class I	Class III	Class V	Class I	Class III	Class V
411	200	0,30	0,15	0,05	0,40	0,20	0,08
541	200	0,30	0,15	0,05	0,40	0,20	0,08
641	250	0,35	0,18	0,05	0,45	0,23	0,08
741	300	0,35	0,18	0,06	0,45	0,23	0,09
841	300	0,40	0,20	0,06	0,50	0,25	0,09
941	400	0,45	0,22	0,07	0,55	0,27	0,10
1091	400	0,50	0,25	0,07	0,60	0,30	0,10

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APPENDIX



- COMMISSIONING DOCUMENTS
- TECHNICAL DATA SHEET FOR THE SELECTION OF A SLEWING RING
- WARRANTY - AFTER-SALES SERVICE

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COMMISSIONING DOCUMENTS

You have taken receipt of a "ROLLIX" slewing ring and we congratulate you for your choice.

The "slewing ring" product is a high technology product selected for precise parameters. It was designed and manufactured to the ISO 9000 standard and supplied based on the informations given in the questionnaire IT ETR 911. It will give you trouble free service if the operating conditions are in line with "ROLLIX" recommendations.

You are a designer, an installer or a retailer, it is your responsibility to check that your or your user's need have been correctly identified in our questionnaire IT ETR 911, that the installation requi-rements and our product maintenance conditions have to be fully respected.

We suggest you study the conditions in this catalogue and our manual and instruction booklet IT ETR 941 so that you are certain of your responsibilities. These documents should be supplied to the user if the situation requires it.

In order to help you, we enclose a check-list which although not comprehensive, covers the minimum essential checks which have to be carried out in all cases.

In addition we suggest you make yourself aware of our guarantee conditions and their limitations.

CHOICE OF THE SLEWING RING

To choose a suitable slewing ring, did you take into consideration :

- the nominal loads ..... ☐
- the overloads due to :
  - wind ..... ☐
  - snow ..... ☐
  - operating conditions ..... ☐
- the loads due to dynamic effects ..... ☐
- peak loads ..... ☐
- test overloads ..... ☐

This for :

- the raceway ..... ☐
- the gear ..... ☐
- the bolting ..... ☐
- the maximum utilization speed ..... ☐

On receipt,
be sure that the slewing ring you receive is the one you have ordered (identification plate).

Storage conditions,

- during the storage time, has the product been protected against external contamination ? ..... ☐
- If storage has exceeded 18 months, has the slewing ring been regreased before installation ? ..... ☐

COMMISSIONING DOCUMENTS

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Before installation,
be sure that the product has not been subjected to shock loads resulting in an alteration of its characteristics (irreversible deformation),

- seals are in place ☐
- seals are not damaged (cut) ☐
- your handling equipment are suitable for the product :
  - quality ☐
  - size ☐
  - weight ☐

During installation,
check :

- the flatness of the supporting base ☐
- the dimensions of the structures ☐
- the position of the filler plug ☐
- the position of the hardening junction in relation to the axis of maximum moments. ☐

During fastening,
check :

- the grade of screws and bolts ☐
- the number of bolts used ☐
- the specified tightening torque ☐
- that the tightening torque is achieved using properly lubricated threads ☐
- that split, fan-shaped or elastic washers are not used ☐
- that hardened flat washers are used if required ☐

Installation of the pinion gear (if necessary),
check :

- the pinion corresponds to the gear of the slewing ring ☐
- there is no risk of interference ☐
- the minimum backlash is maintened ☐
- the measurement is determined at the point of :
  - maximum offset of the external gear ☐
  - maximum offset of the internal gear ☐
- the slewing ring / pinion centre distance cannot vary ☐
- the contact area of the pinion on the slewing ring gear face is uniform ☐

Before installation,
be sure :

- the maximum slewing ring speed will not exceed the calculated value ☐
- no objects will foul the slewing ring rotation ☐
- no objects will damage the seals ☐
- the slewing ring and its pinion do not cause any danger
  - to material ☐
  - to people ☐
- that protection complies with the recommendations of 89/392 EEC ☐

COMMISSIONING DOCUMENTS

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- Check
- the deflection under the maximum design load and record the results ..... ☐
- the rotation is without abnormal noise or tight spots ..... ☐

After the installation,
- be sure,
- no deformation can affect the functionning of the assembly ..... ☐
- no deformation can decrease the life of the product ..... ☐

In operation,
- be sure that the user :
- knows the lubrication specifications and in particular :
  - type of grease ..... ☐
  - frequency of lubrication ..... ☐
  - the method of regreasing ..... ☐

  and this for :
  - the rolling elements ..... ☐
  - the gear ..... ☐
- will observe the condition of seals ..... ☐
- knows the frequency
  - of checking bolt tightening ..... ☐
  - of bolt replacement ..... ☐
- knows the maximum permissible clearance in the product before dismounting ..... ☐
- or the designed maximum clearance allowable ..... ☐

- For your information :

A manuel and instruction booklet IT ETR 941 is available upon request at our Commercial Department. We advise you to include our maintenance specifications in those of the machine or failing that, to transmit them to the user.

ROLLIX	For ROLLIX	For the USER
3, Rue Louis Renault B.P. 329 F - 44803 ST HERBLAIN Cedex Tel. 33 (0)2 40 67 89 89 Fax 33 (0)2 40 67 89 03 E-mail : Info@rollix.com	N° Affaire : Date : AC ☐ VI ☐ RC ☐ Visa :	Name : Date : Signature :

DESIGN DATA SHEET

1.1	COMPANY :					Tel. :		
1.2	Address :					Fax :		
1.3	Person in charge of the project :					Fonction :		
2.1	DESCRIPTION OF THE APPLICATION + sketch (to be attached with loads applied)							
2.2	Machine / project reference :					New project : Yes ☐ No ☐		
2.3	Slewing ring position : Horiz. ☐ Vert. ☐ Other ☐ Utilisation mode : Continu. ☐ Intermittent ☐ Other ☐							
3.1	LOADS ON THE BEARING (including structural loads) :					Applied ☐	Suspended ☐	
3.2			Static			Dynamic		
3.3			Nominal	Maximum	Test	Nominal	Maximum	Test
3.4	Utilisation	% Time						
3.5	Axial	kN						
3.6	Radial	kN						
3.7	Moment	kNm						
3.8	Rotating ring : Ext ☐ Int ☐ Speed (RPM)							
3.9	Load factors applied : Excluded ☐ Included ☐ Values :							
3.10	Required life :							
4.1	GEAR External ☐ Internal ☐ Without gear ☐							
	Geometry		S.R.	Pinion		Loads	S.R.	Pinion
4.2	Required Module					Tangentiel load (kN)		
4.3	Number of teeth required					Torque (kNm)		
4.4	Addendum modif.factor							
5.1	CRITICAL ITEMS Dimensions					Others :		
5.2	Classification ☐ Commission ☐ FEM ☐ LLOYDS ☐ API ☐ BV ☐ DNV ☐ Other							
5.3	Specification relative to the application :							
	SPECIFIC REQUIREMENTS OF THE APPLICATION							
6.1	Environment :					Operating temperature :		
6.2	Vibrations, shocks loads :					Storing temperature :		
6.3	Acceleration :		Deceleration :			Inert. mom./Rotation axis :		Varied :
7.1	QUANTITY Yearly requirements :					Qty per delivery :		
8.1	REQUIRED DELIVERY TIME :							

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Document available at the Commercial Department

WARRANTY - AFTER-SALES SERVICE

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OBJECT OF THE WARRANTY

The ROLLIX DEFONTAINE "SLEWING RING" product is warranted **for good working** within the scope of normal usage under the following criteria :

• for standard products, usage is as per the conditions of application, the technical specifications as indicated in the catalogue reference IT ETR 921 and the instruction manual IT ETR 941 applicable to the product.

• for all products, usage is as per the indications provided by the customer in answer to the questionnaire reference IT ETR 911.

WARRANTY PERIOD

The warranty for slewing ring gears is for **TWO YEARS** after delivery, and **FIVE YEARS** after delivery with regard to defects in:

• Material origin,
• Manufacture
• Factory assembly.

For geometric defects, the warranty period however remains fixed at **TWO YEARS** after delivery.

In all cases, the warranty period is limited to the estimated service life of the product as shown in our calculation sheets or other ROLLIX documents. This theoretical value comes from a statistical calculation and can in no way be considered as a commitment as to the result.

CONDITIONS OF APPLICATION - EXCLUSIONS

The warranty of the "SLEWING RING" product with respect to the application will not apply in the various following cases :

1 The questionnaire reference IT ETR 911 has not been completed and returned to ROLLIX.

The "SLEWING RING" product is a high technology product destined to satisfy **PRECISE NEEDS**.

The supply of a suitable product therefore depends on ROLLIX knowing the exact conditions of application and expected utilization by the customer.

A specific questionnaire reference IT ETR 911, constituting specifications are systematically made available to the customer before order placement.

The supply of a product suitable to customer's needs is based on his precise and complete answers to the questionnaire IT ETR 911. **Application conditions which fall outside the stipulations thereon may constitute a case of exclusion of the ROLLIX warranty.**

2 Non-compliance with ROLLIX recommendations

Handling, utilization, mounting and maintenance which do not comply with our recommendations listed on the maintenance manual of the product sold, notably :

Handling

• Handling equipment not suitable to the quality and weight of the parts.

Utilization

• Utilization not complying with the technical specifications and with the conditions of application of the product.

Mounting

• Incorrect dimensioning of the support structures under minimum stated limits and flatness out of tolerances.
• Incorrect positioning of the filler plug with respect to the axis of moments.

WARRANTY - AFTER-SALES SERVICE

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Fastening

• Screws and nuts not complying to our recommendations as well as to the required pretensioning.

• Utilization of split, fan-shaped, elastic or non-hardened washers whatever the brand or the model.

Greasing

Non-compliance with recommended types of grease as well as regreasing frequency.

Storage

• Non renewal of the external protective substance after six month storage.

• No regreasing of the slewing ring in rotation after eighteen month storage.

3 Modification, dismantling or repair of the product carried out without ROLLIX previous agreement.

4 Damage resulting from normal wear of the material

The increase of clearance under load within the scope of the utilization limits constitutes normal wear.

The warranty is not applicable to the wearing parts such as seals.

More generally, the warranty will not be applied in case of malfunctions resulting directly or indirectly from a fault or an act of negligence of the customer.

IMPLEMENTATION OF THE WARRANTY

The warranty for the satisfactory functioning of the "SLEWING RING" product will be granted after :

• notification of malfunction by the customer in the allotted time (see page 112 : WARRANTY PERIOD)

• observation of the malfunction by ROLLIX

• examination of the respective product's technical specifications, ROLLIX previous recommendations and other conditions applicable to the warranty.

No return will be accepted without ROLLIX prior agreement, that is to say after receipt of the duly filled in appendix 1 of the procedure PG.CRX.19.00.

WARRANTY

In the case of notified malfunction observed, and after carrying out the usual examinations, ROLLIX will proceed to :

• repair of the SLEWING RING with possible replacement of the parts considered damaged,

• or arrange for the free replacement of the SLEWING RING,

• or arrange for the reimbursement of the sale value of the SLEWING RING.

In all cases, ROLLIX reserves the right to select the most suitable solution for the problem observed.

The ROLLIX warranty is strictly limited to repair, replacement or reimburse-ment of the part considered damaged, and therefore will not be extended to any other consequential damage likely to be linked to the malfunction : machine stoppages, damage of goods other than those of the contract, loss of income...

In the case of malfunction of a "SLEWING RING" product which is linked to an act of negligence or a fault of the customer, and notably to the non compliance of the ROLLIX recom-mendations, the survey costs of the damaged part, including transport and all travelling expenses for technicians to the commission site will be charged to the customer's account.

CAUTION

All data and informations contained in the present catalogue have been carefully evaluated and checked. We cannot, however, be liable for any errors or omissions. We reserve the right to make all technical changes and amendments in tests, formulae and drawings without prior notice.

All earlier editions are invalid with effect from the publication of this catalogue.