T·Y·Gear
Since 1974

UNIVERSAL JOINT

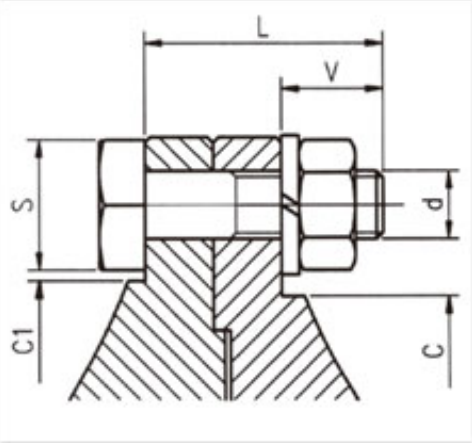
TIEN YI GEAR WORKS CO., LTD.

TY-UJ(1)-12E

index

TYL TYPE

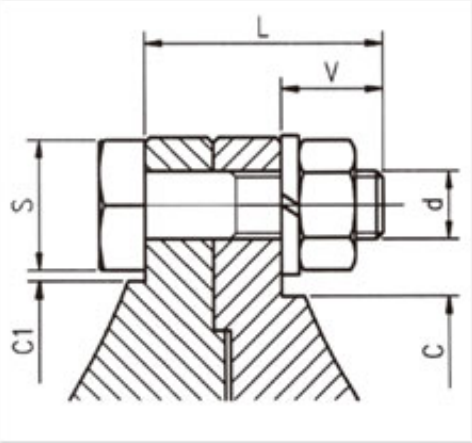
Dimensions of assembly of universal joint flange



		TYL-58	TYL-65	TYL-75	TYL-90	TYL-100	TYL-120	TYL-150	TYL-160	TYL-180	TYL-200
Flang dia	mm	58	65	75	90	100	120	150	160	180	200
C	mm	35	39	48	57	66	80	99	99	119	138
C1	mm	38.5	43.5	51.6	60	69.5	84	110.3	110.3	132.5	152
d	mm	M5	M6	M6	M8	M8	M10	M12	M12	M14	M14
L	mm	13	16	18	23	23	28	33	33	40	40
V	mm	6	7	7	11	9	11	13	13	16	16
S	mm	4	4	6	4	6	8	8	8	8	8

TYB TYPE

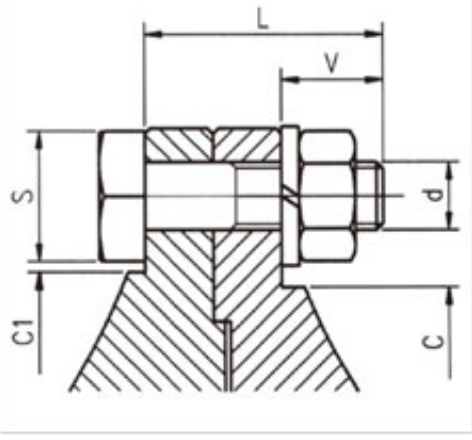
Dimensions of assembly of universal joint flange



		TYB-225	TYB-250	TYB-285	TYB-315	TYB-350	TYB-390	TYB-435
Flang dia	mm	225	250	285	315	350	390	435
C	mm	158	175	196	230	260	288	320
C1	mm	171	190	214	247	277	307	342
d	mm	M16	M18	20	22	22	24	27
L	mm	55	60	70	75	80	90	100
V	mm	24	24	30	31	30	34	36
S	mm	24	27	30	32	32	36	41

TYB-S TYPE

Dimensions of assembly of universal joint flange

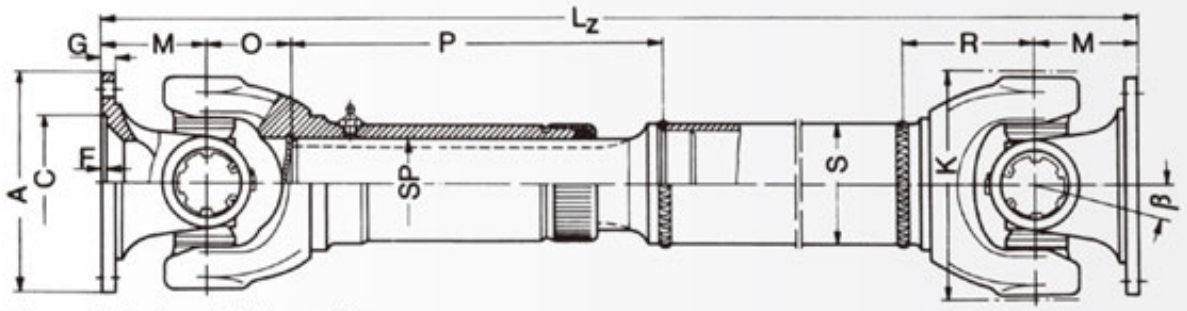


		TYB-225	TYB-250	TYB-285	TYB-315	TYB-350	TYB-390	TYB-435
Flang dia	mm	225	250	285	315	350	390	435
C	mm	158	175	196	230	260	288	320
C1	mm	171	190	214	247	277	307	342
d	mm	M16	M18	M20	M22	M22	M24	M27
L	mm	60	75	80	90	100	110	120
V	mm	20	25	26	26	30	30	36
S	mm	24	27	30	32	32	36	41

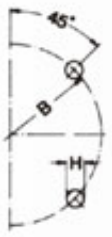
TYL TYPE

(LIGHT LOAD AND MEDIUM LOAD) DESIGN

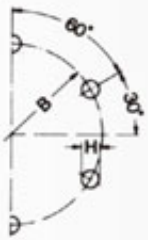
- TELESCOPIC TYPE
- FIXED LENGTH TYPE
- SHORT TYPE WITH FLEXIBLE LENGTH



Flange Bolthole and design pattems



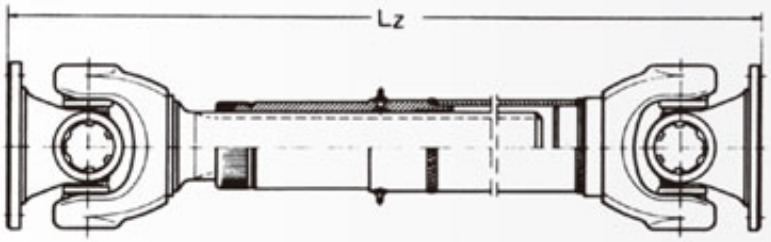
4-hole flange

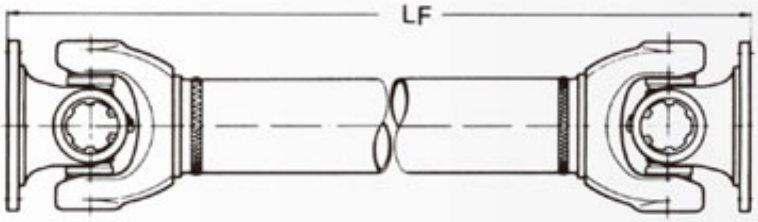


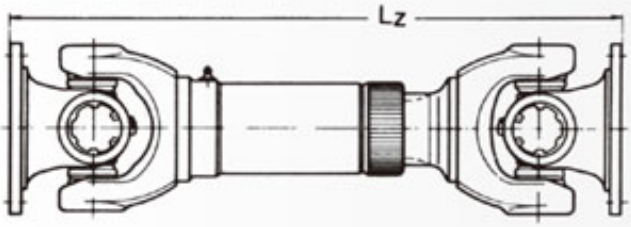
6-hole flange

8-hole flange

Fixed hole to all joints



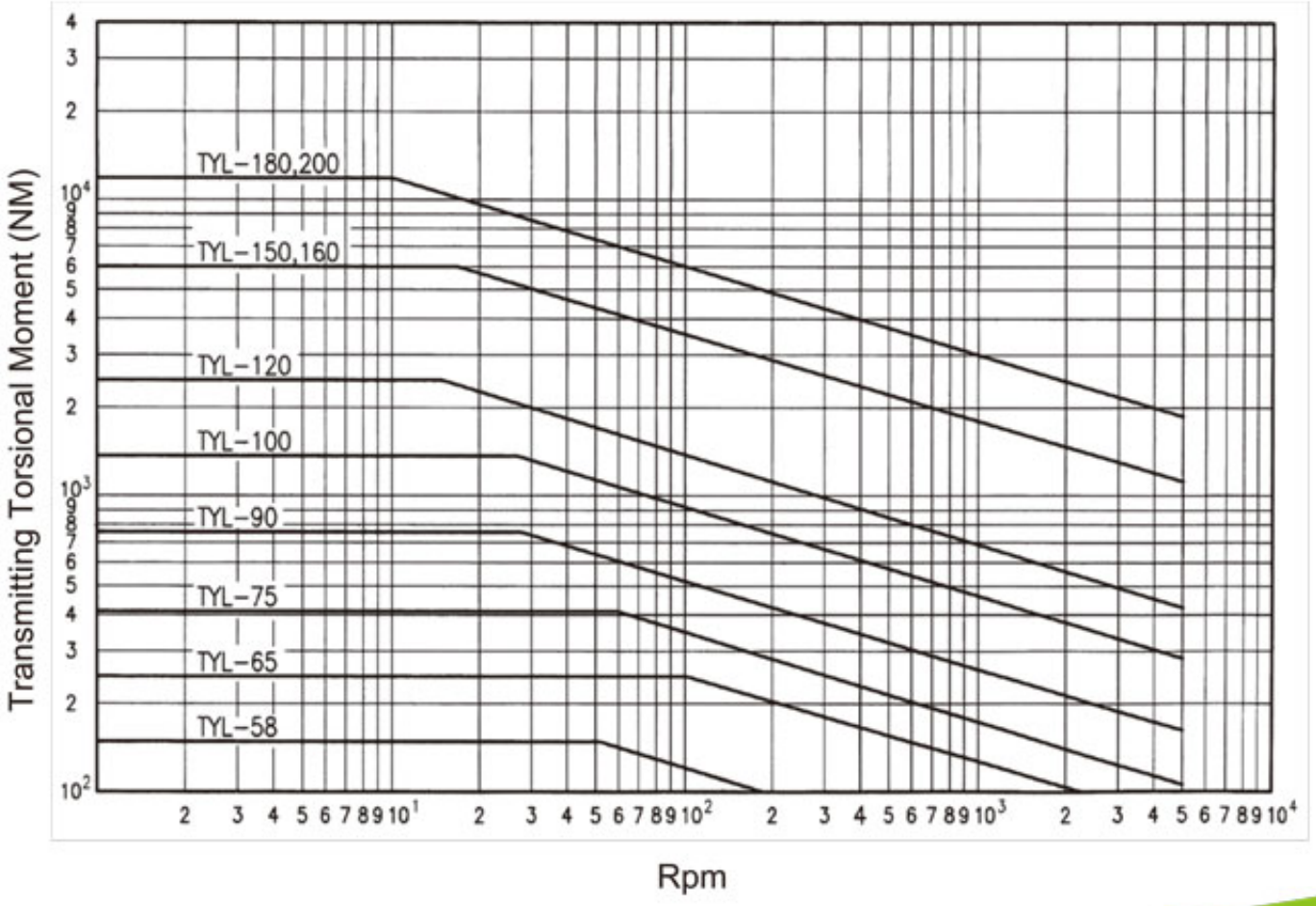




SIZE		Td	β	A(K)	P.C.D. B	CH7	F	G	M	P	R	SP	S	Bolt N-øH	La	Lz
TYL	DIN	N-m		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
TYL- 58	473.1	150	30	58	47	30	1.5	3.5	32	127	36	21	32	4 x ø5	35	250
TYL- 65	473.2	250	25	65	52	35	1.7	4.5	32	127	40	21	32	4 x ø6	40	280
TYL- 75	473.3	400	25	75	62	42	2	5.5	39	169	45	34	40	6 x ø6	40	315
TYL- 90	287	755	25	90	74.5	47	2.5	6	52	188	58	32	50.8	4 x ø8	40	375
TYL-100	287.1	1350	25	100	84	57	2.5	7	58	217	55	35	60	6 x ø8	45	415
TYL-120	287.2	2400	25	120	101.5	75	2.5	10	72	265	70	45	70	8 x ø10	60	520
TYL-150	587.2	6000	25	150	130	90	3	10	86	305	85	60	90	8 x ø12	70	600
TYL-160		6000	25	160	140	100	4	10	86	305	85	60	90	8 x ø12	70	600
TYL-180	587.35	10000	25	180	155.5	110	3	12	100	250	103	72	100	8 x ø14	80	660
TYL-200		12250	15	200	175	125	5	20	115	180	125	100	152	8 x ø14	90	700

Td = Premissible torque **β**= Maximun deflection angle **Lz** = Standard length **La** = Length compensation

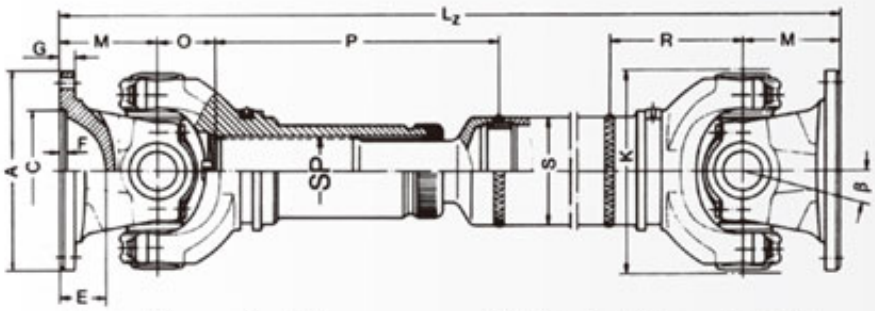
TYL Type Torsional Moment Table



TYB TYPE

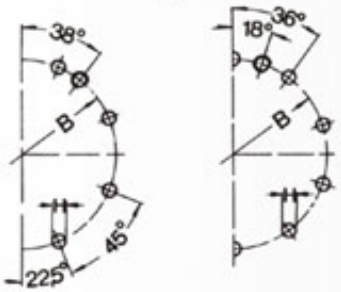
(MEDIUM LOAD) DESIGN

- TELESCOPIC TYPE
- FIXED LENGTH TYPE
- SHORT TYPE WITH FLEXIBLE LENGTH



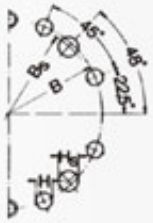
Standard flange disc joint

Positioned pin flange disc joint



8-hole flange

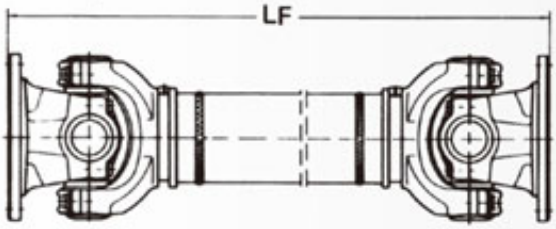
10-hole flange

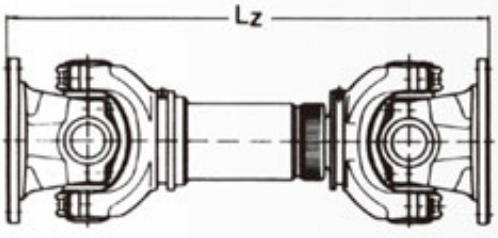


8-hole flange

10-hole flange

Fixed hole distrbution to all joints



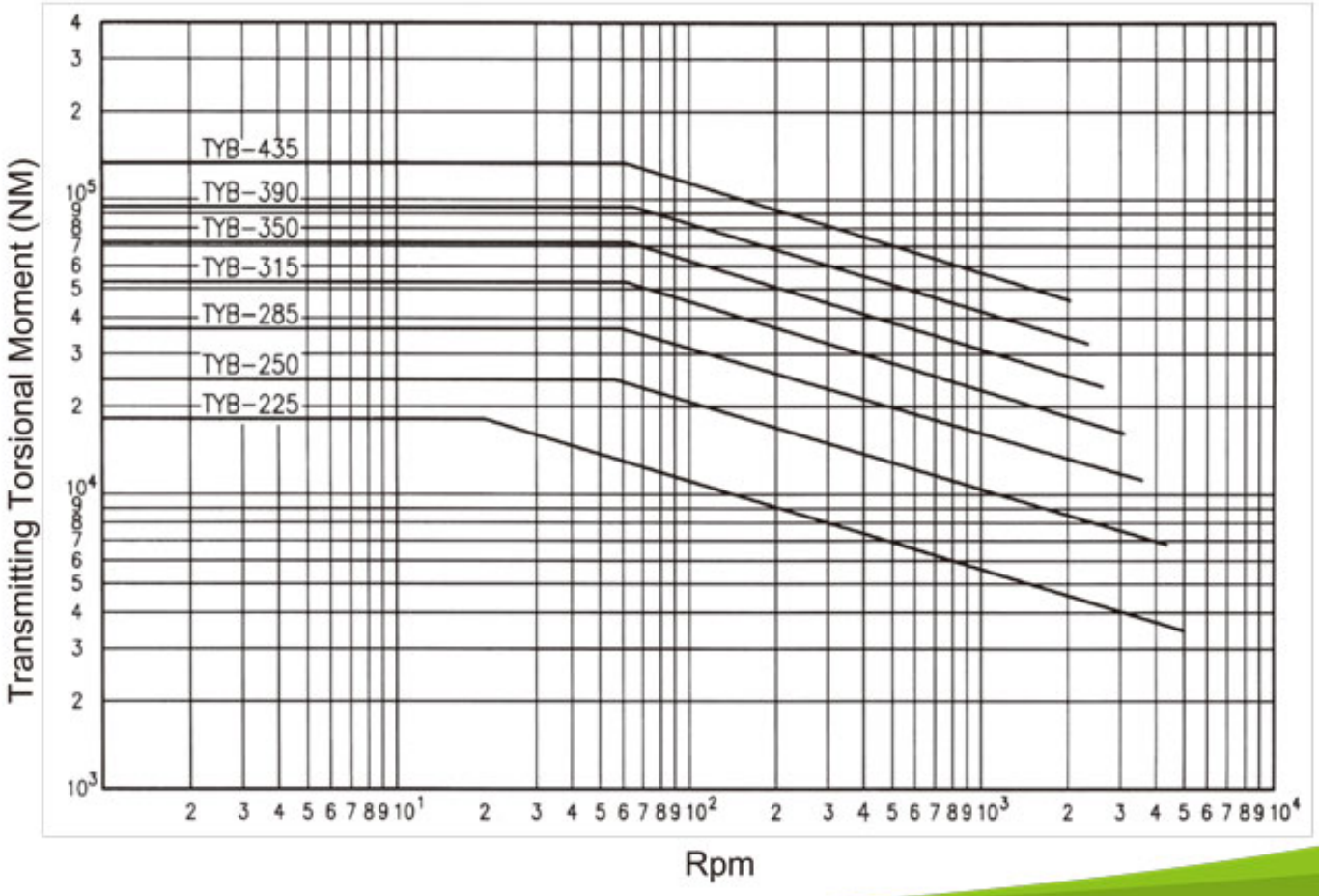


SIZE		Td	β	A(K)	P.C.D. B	CH7	F	G	M	P	R	SP	S	Bolt N-øH
TYL	DIN	N-m		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
TYB-225	190.5	18000	15	225	196	140	5	20	130	385	175	105	162	8 x ø16
TYB-250	190.55	25000	15	250	218	140	7	25	135	420	190	115	178	8 x ø18
TYB-285	190.6	37000	15	285	245	175	7	27	150	498	210	130	212	8 x ø20
TYB-315	190.65	52000	15	315	280	175	7	32	170	590	240	150	240	8 x ø22
TYB-350	190.7	72000	15	350	310	220	8	35	185	650	260	170	254	10 x ø22
TYB-390	190.75	94000	15	390	345	250	8	40	205	703	300	185	296	10 x ø24
TYB-435	190.8	136000	15	435	385	280	10	42	235	740	330	209	318	10 x ø27

SIZE	UNIT	TYB-225S	TYB-250S	TYB-285S	TYB-315S	TYB-350S	TYB-390S	TYB-435S
Lz	mm	965	1035	1180	1375	1485	1620	1795
La	mm	85	90	120	135	150	150	170
G	Kg	120	156	238	365	495	659	1044
GR	Kg	6.5	8.2	10.3	12.6	16.6	20.6	24.5

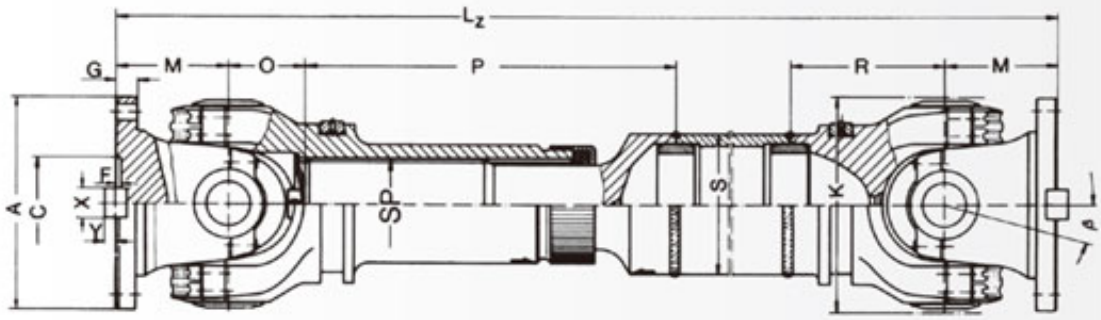
Td = Premissible torque **β**= Maximun deflection angle **Lz** = Standard length **La** = Length compensation
G = joint weight **GR**= weight for each 100mm extension tube

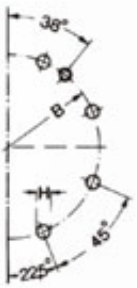
TYB Type Torsional Moment Table



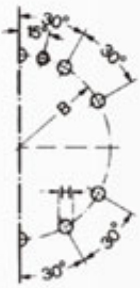
TYB-S TYPE (HEAVY LOAD AND SUPER HEAVY LOAD) DESIGN

- TELESCOPIC TYPE
- FIXED LENGTH TYPE
- SHORT TYPE WITH FLEXIBLE LENGTH

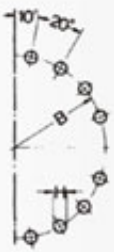




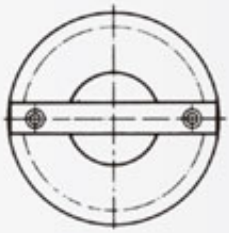
8-hole flange



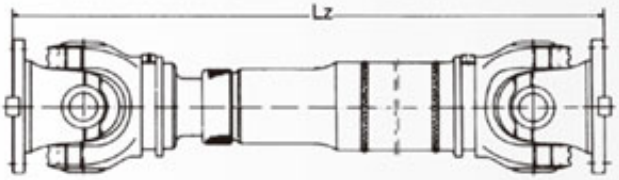
10-hole flange

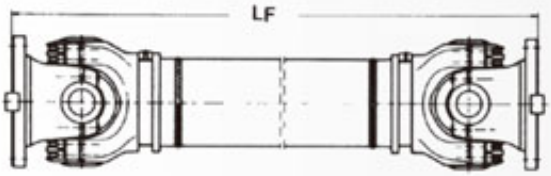


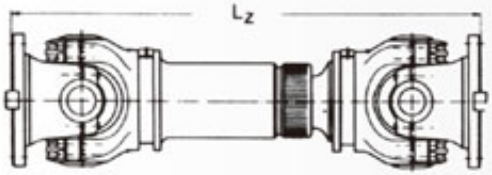
16-hole flange



Fixed hole distrbution to all joints





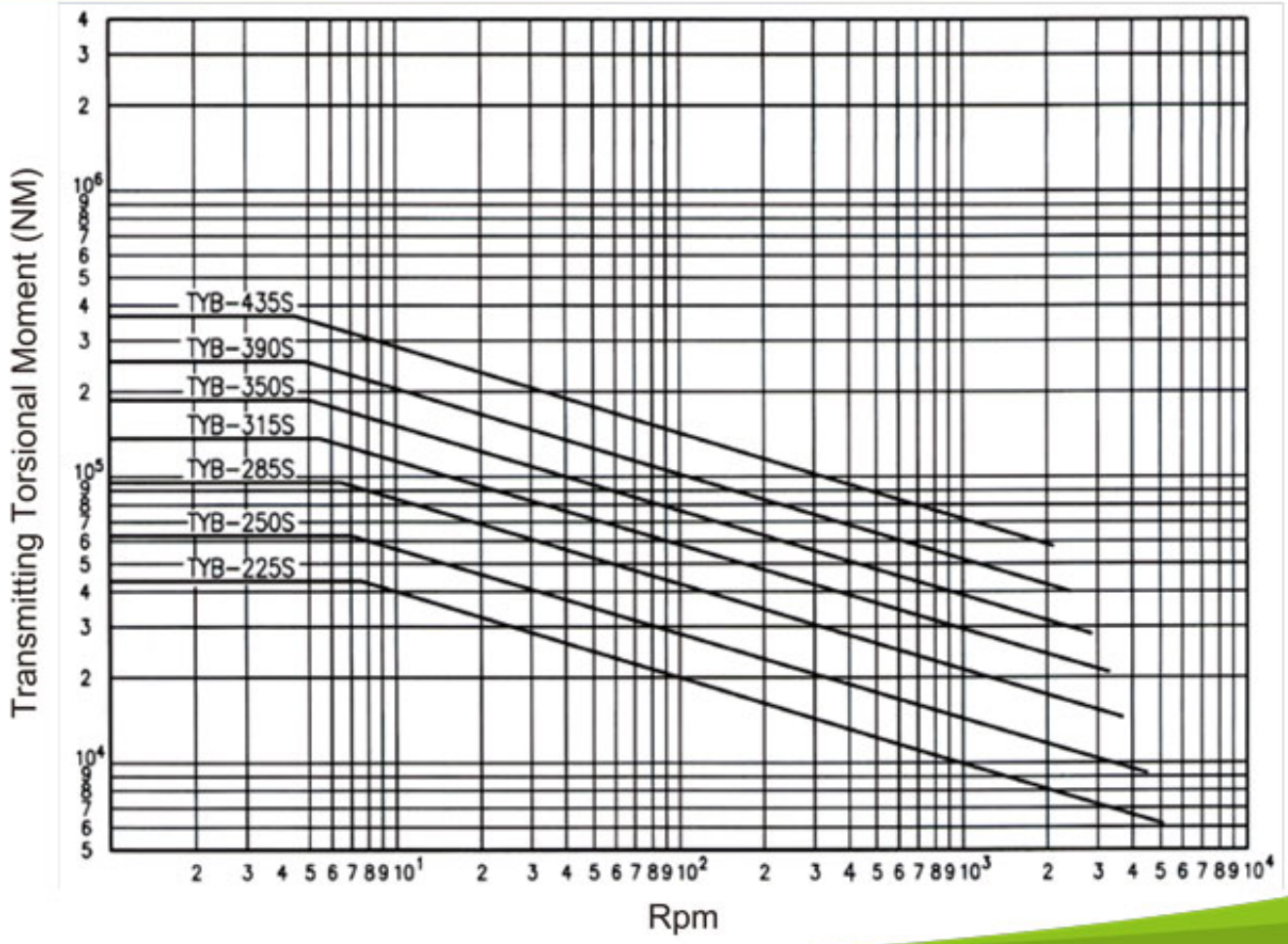


SIZE		Td	β	A(K)	P.C.D. B	CH7	F	G	M	P	R	SP	S	Bolt N-øH	X	Y
TYB-S	DIN	N-m		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
TYB-225S	292.5	44000	10	225	196	105	5	20	130	385	175	105	162	8 x ø17	32	9
TYB-250S	292.55	64000	10	250	218	105	6	25	135	420	190	115	178	8 x ø19	40	11
TYB-285S	292.6	98000	10	285	245	125	7	27	150	498	210	130	212	8 x ø21	40	13
TYB-315S	292.65	140000	10	315	280	130	8	32	170	590	240	150	240	8 x ø23	40	13
TYB-350S	292.7	190000	10	350	310	155	8	35	185	650	260	170	254	10 x ø23	50	14
TYB-390S	292.75	260000	10	390	345	170	8	40	205	703	300	185	296	10 x ø27	70	18
TYB-430S	292.8	369000	10	435	385	190	10	42	235	740	330	209	318	10 x ø28	80	20

SIZE	UNIT	TYB-225S	TYB-250S	TYB-285S	TYB-315S	TYB-350S	TYB-390S	TYB-435S
Lz	mm	965	1035	1180	1375	1485	1620	1795
La	mm	85	90	120	135	150	150	170
G	Kg	120	156	238	365	495	659	1044
GR	Kg	6.5	8.2	10.3	12.6	16.6	20.6	24.5

Td = Premissible torque **β**= Maximun deflection angle **Lz** = Standard length **La** = Length compensation
G = joint weight **GR**= weight for each 100mm extension tube

TYB-S Type Torsional Moment Table



The selection of universal joint shafts

1. CALCULATED NOMINAL TORQUE

1. Generally, Universal joint shaft are selected according to the torque to be transmitted where it's means load features, calculated torques, bearing life and operating speed. They can be also be selected by checking their torque strengths or bearing life with relation to the requirements of the applicable equipment.

   i. The calculated torque is acquired from the following formulas (A) or (B).

   $$(A)TMAX = 716.2 \times \frac{HP}{N} \times k \times 9.8 \text{ (N-M)}$$

   $$(B)TMAX = 974 \times \frac{KW}{N} \times k \times 9.8 \text{ (N-M)}$$

   Where,
   TMAX = calculated torque, N-M;
   HP=Driving power, hp;
   KW=Driving power, kw;
   n= Operating speed, rpm
   K = Service factors (shown in the table to the right)

   ii. Checking the torsional strength use the following Formula
   TMAX x ≤ Td
   TMAX = calculated torque (N-M)
   Where,
   Td = Maximum torque (N-M)
   K = Service factors (shown in the table to the right)

2. TO CALCULATE THE TORQUE

The scale of joint chosen with an aim at service life should be used according to the calculated torque determined by the correction coefficient for the continuous torque and the condition of its actuation.

TA = TD . K0 . K1 . K2 . k3
TA = Calculated torque N-M
TD = Continuous torque N-M
K0 = Load coefficient for bearing, 1.3-1.5
K1 = Impact coefficient
K2 = Life coefficient
K3 = Bending angle coefficient

K1 IMPACT COEFFICIENT

Prime motor	Cylinders	K1
Electric motor		1.00
Gasoline generator	4 < 1~3	1.25 1.5
Diesel generator		1.5 2.00

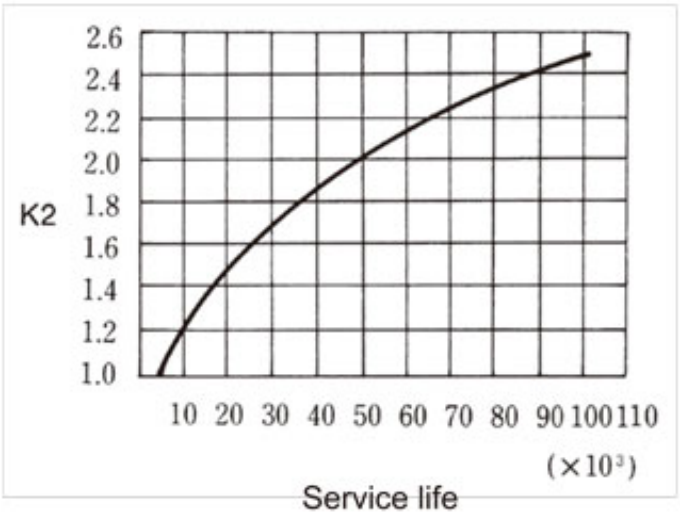
K1 should exceed 0.5 where the usage is to drive an internal combustion engine without choosing flexible couplings.

Coefficient of use K

Service factor	Driven Equipment	K
Constant load	• Centrifugal pump • Generator (continuous) • Conveyor • Small ventilator	1.2 - 1.5
Light shock load	• Centrifugal pump • Generator (non-continuous) • Conveyor(non-continuous) • Medium ventilator • Machine tool • Printing machine • Wood processing machine • Small paper machine & loom	1.5 - 2.5
Medium shock load	• Pump (multi-cylinder) • Compressor (multi-cylinder) • Large ventilator • Transmission mechanism for vessels • Roller selector for cloth and paper • Conveying roller table • Cable puller • Small clip roller • Small tube making machine • Primary driving mechanism on motorbike • Heavy duty paper machine and loom	2.5
Extra heavy shock load	• Compressor (single-cylinder) • Pump (single-cylinder) • Mixer • Moving mechanism on crane • Bucket wheel cultivator • Presser • Rotational oil driller • Secondary driving mechanism on motorbike • Continuous operational roller table • Medium mold steel plant • Continuous flat block & medium block roller • Continuous heavy duty tubing maker	3
Extreme shock load	• Paper pressing roller drive mechanism • Wrapping paper roller drive mechanism • Reversible operational roller table • Reversible flat block & medium block roller • Impact scaler • Vibratory conveyor	4 ~ 6

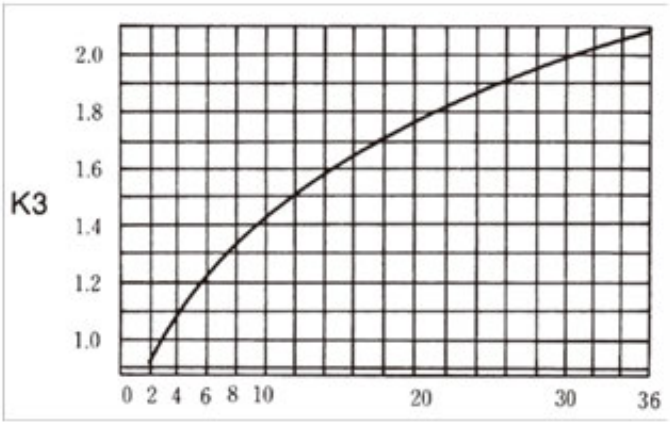
K2 life coefficient

For the service life different from the basic 5000 hr listed in the torque table, an appropriate coefficient should be chosen from the below chart



K3 deflection angle coefficient

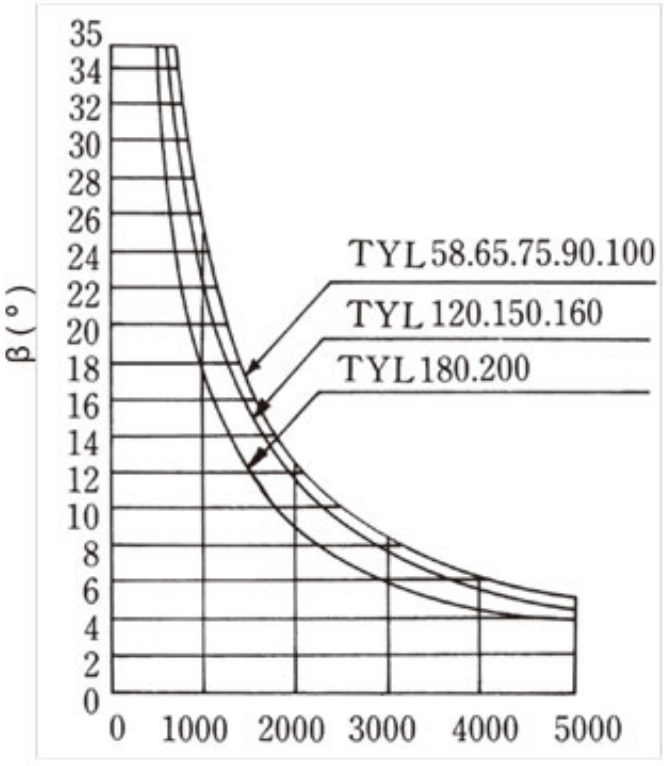
With a deflection angle coefficient other than 3°, it is necessary to use a deflection angle coefficient (below chart) corresponding to the required service life.



3. RELATIONSHIP BETWEEN PERMISSIBLE SPEED AND DEFLECTION ANGLE

When universal joints are operated at any angle greater than zero, the center section of the universal joint always runs irregularly, being accelerated and decelerated twice in every revolution. The maximum values of mass acceleration torque arising here are dependent on the operating speed and angle of deviation ß and upon the moment of inertia of the center shaft section. To ensure smooth running of the universal joint, the mass acceleration torque must not be allowed to exceed the limits shown in the following diagram.

Maximum permissible speed in relation to operating deflection angle in TYL model



4. CRITICAL ROTATION AT DEFLECTION

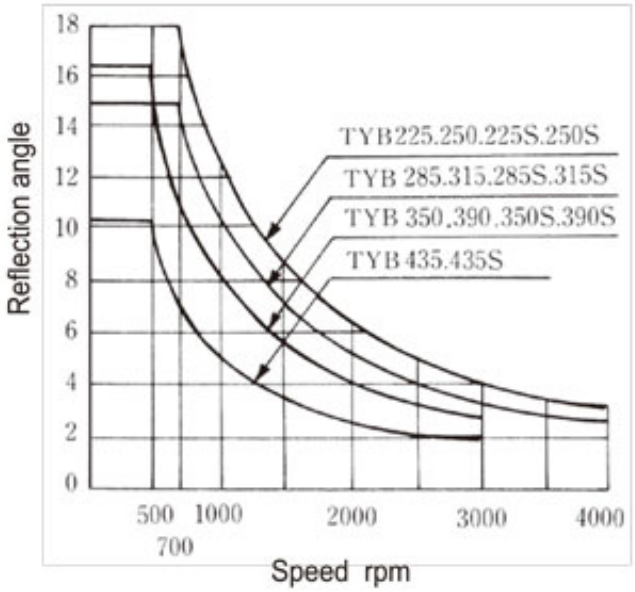
The universal joint is a flexible body with deflection, as the flexibility should correspond to the critical rotation. For safety reason, there should be an adequate distance between the allowed maximal rotation and the critical rotation.
Calculation of critical rotation with flexibility is as follows

$$n\ critical = 1.22 \cdot 10^7 \cdot \sqrt{D^2+d^2} \cdot \frac{1}{L^2C}\ r.p.m.$$

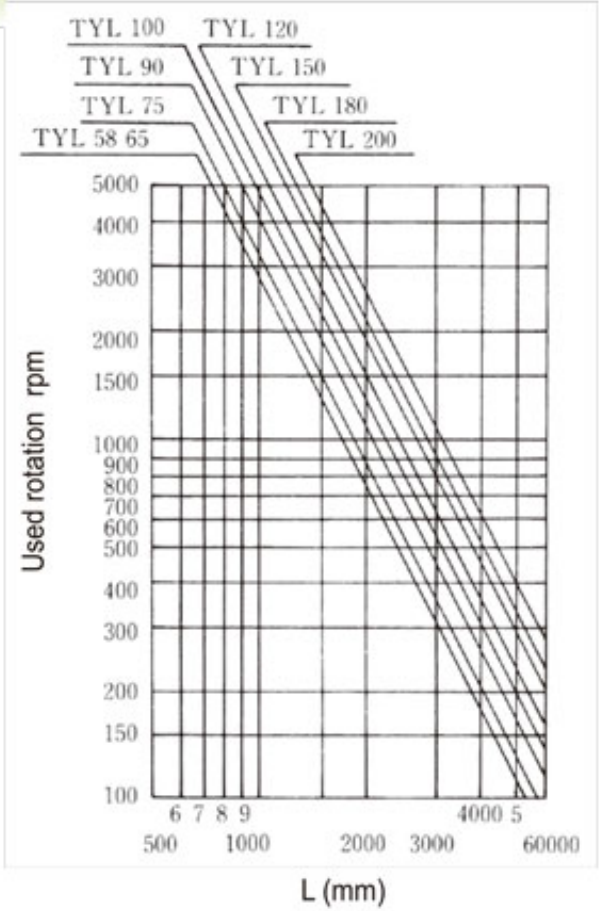
D = outer diameter of tube (mm)
D = inner diameter of tube (mm) (cm)
Lc = distance between horizontal pins (cm)
Then, allowed rotation
n Max. allowed = 0.65 • n critical r.p.m.
The relationships of the models are shown below charts.

Relationship between reflection angle and speed limitations in TYB model

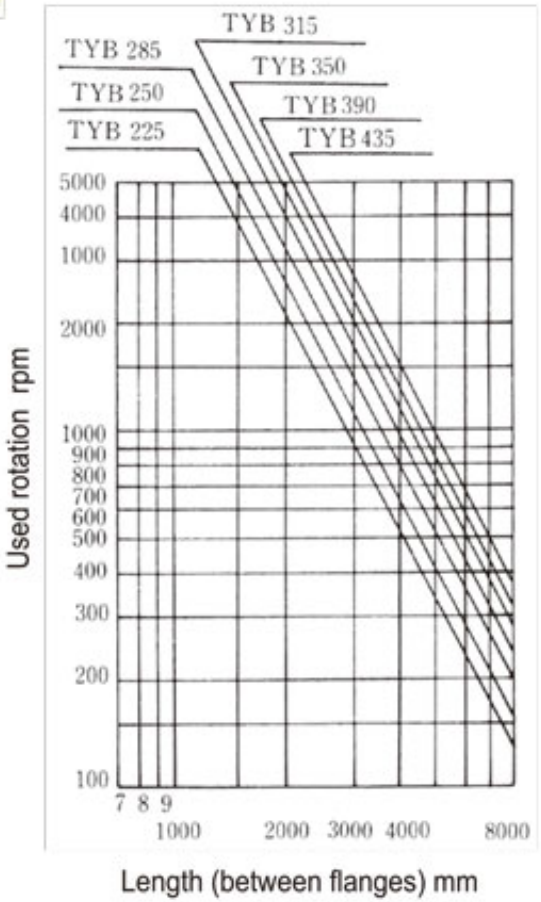
(this value is the same if the TYB-S models are of the same number)



Maximum permissibile speed in reation to operating length



Relationship between length and critical rotation in TYB model



Installation and maintenance

HANDLING AND STORAGE

IMPORTANCE – Read Carefully

These instructions are provided to aid in the proper handling, installation and maintenance of Tien YI universal joint shafting. They should be carefully read and followed. Failure to do so may result in unsatisfactory service as well as serious personal injury or property damage.

Upon receiving the universal joint shaft assembly, the customer should.

(1) Examine all shafting and related material upon arrival and note any damage or shortage on bill of lading. Such damage is the responsibility of the freight carrier.

(2) While transporting and lifting universal joint shaft assembly, do not place a sling or chain around the intermediate shaft, or around spline/spline cover in the case of telescopic shafts. Otherwise, splines could slide out the cover and cause damages to the assembly or even human injuries. (Figure 1)

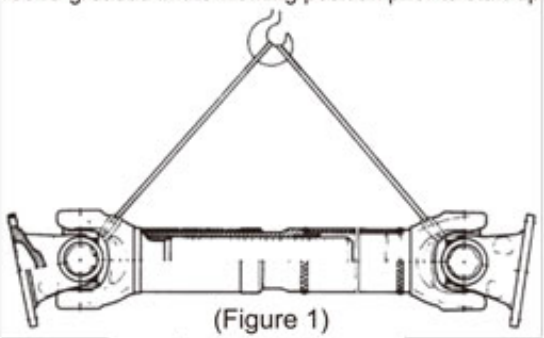
(3) Always handle and transport in a horizontal position except when handling a unit designed for vertical application. (Figure 1)

(4) Balance weights should not be removed. Unbalance will cause vibrations and premature wear of shafting and the bearings of the connected units.

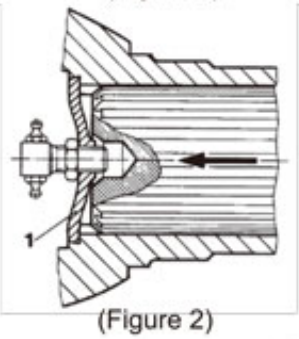
(5) Shocks, bumps and mishandling must be avoided to assure proper performance. Abuse could result in bending the driveshaft, causing whipping and unbalance problems.

(6) With hold down bolts, are necessary to maintain alignment and to eliminate damaging vibration

(7) Shafts that have been stored for over 6 months should be re-greased in the working position prior to start up.



(Figure 1)



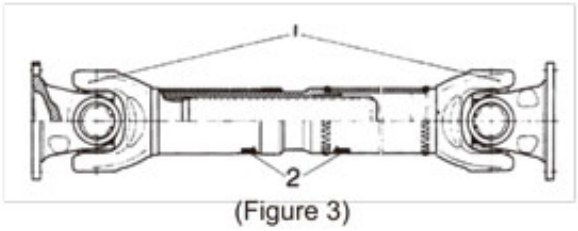
(Figure 2)

INSTALLATION

(1) Check flange bores and shaft diameters for proper fit. All mating surfaces, bores and faces must be clean and free from grease, oil, dirt, nicks and other contaminates to insure a proper fit and function of mating parts.

(2) Compress driveshaft and place into position between mating flanges. Large universal joint shaft assemblies are very heavy, use proper lifting equipment during installation. Carefully align pilot bore boss into/onto companion flange mating diameter. Align bolt holes on driveshaft flange with holes on companion flange. Secure flange to driveshaft with proper hardware. Extend shaft at slip section until pilot bore boss aligns with companion flange pilot bore boss. Align holes and secure flange.

(3) Check the phases of the yokes at each end of the intermediate shaft to make sure that their bearing bore axis are in the same plane ; This basic requirement must be satisfied, no matter what type of universal joint assembly is being installed. (Figure 3)

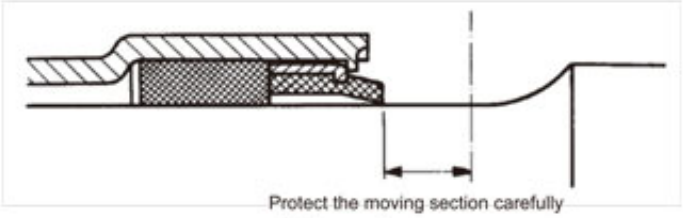


(Figure 3)

(4) Check the run-out of the flange face and pilot diameter.

(5) Cover the vent hole and pressure fill the spline shaft until grease purges the shaft seal.

(6) Do not try to use inadequate hardware to turn the both end of u-joint shafts, it will cause the damage of bearing seals, sealing screws and pressure relief valve.



(Figure 4)

Important:

For fixed length shafts, one companion flange must be free to move to allow slight length variation due to temperature changes.

Installation and maintenance

MAINTENANCE

Our universal joint assemblies require a minimum amount of maintenance. However, following a regularly scheduled maintenance program will assure maximum performance and extended life. The following is recommended as a guide for maintenance. Perform regular check-ups on the universal joint operation in the following respects:

(1) Check daily the fasteners and mating flanges for tightness. Re-tighten if necessary to the proper tightening torque.
(2) Check the performance of the universal joints and the sliding spline section for excessive wear, which may cause abnormal vibration and noise. Any presence of such abnormalities should be thoroughly investigated to determine the cause and the universal joint should be overhauled.
(3) Perform regular lubrications as recommended.

LUBRICATION

At Tien Yi Gear Works, the universal shafts are lubricated with greases.

(1) Grease lubrication
For lubricating the universal shafts, it is necessary to use greases that contain lithium soap.

(2) Important:
This universal shaft has been lubricated before assembly; its work temperature ranges between +80°Cand -25°C.

By work temperature here, it refers to the temperature of the universal shaft. The work temperature comprises the following:

- its body temperature as a function of n x β and the torque.
- heat that is conducted from outside.

To use the universal shaft beyond this work temperature range, be sure to contact us.

In subsequent lubrication, be sure to use lubricant grease with the same permeability.

Clean the threaded lubricator cap before lubricating.

In subsequent lubrication, the use of high pressure or impact to inject the lubricants is prohibited.

A universal shaft with its bearing having been left unused for over 6 months should be lubricant sealed in good assembled condition before starting.

(3) Location of lubrication
Lubricate the universal shaft by filling the lubricant grease in every threaded lubricating port till the grease flows out of the seal and breather valve: from the first universal joint (fork end of the shaft), from the second joint (fork end of the shaft), and from the joint at the neck.
In order for the grease pressure to decrease fast, it is necessary to use the attached breather valve.
Lubricate the universal shafts of TYB and TYB-S series at the portion where the fork at shaft end connects to the shaft neck.
The universal shaft needs not many maintenance tasks. It is recommended to check the lubricants while carrying out large scale inspection.

(4) Lubricants:
For TYB series of universal shafts lubricated by SKS oil, we recommend SAE 140 reduction oil.
Additional lubrication period
It is recommended to carry out lubrication and inspection at the following interval.

UNIVERSAL SHAFT			
Universal shaft series		Lubricant	Interval of lubrication
TYL	58 ~ 225	Grease	3 months
TYB	225 ~ 435	Grease	3 months
TYB-S	225 ~ 435	Grease	12 months

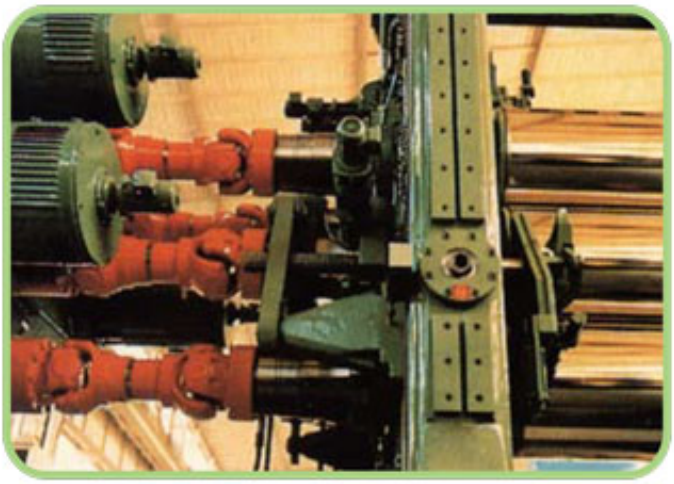
AXIAL MOVING SECTION			
Universal shaft series		Lubricant	Interval of lubrication
TYL	58 ~ 225	Grease	3 months
TYB	225 ~ 435	Grease	3 months
TYB-S	225 ~ 435	Grease	3 months

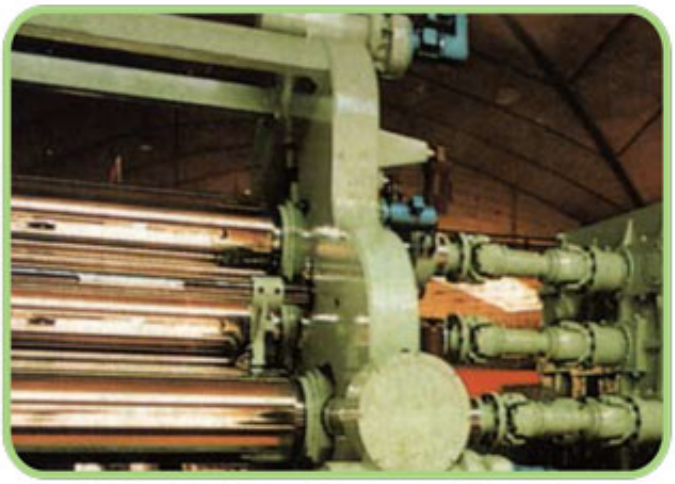
Lubrication is required within shorter interval for worse work conditions. For universal shafts with moving section that has undergone surface treatment with synthetic substances (as users may require), the inspection interval can be extended to 12 months.

SERVICING

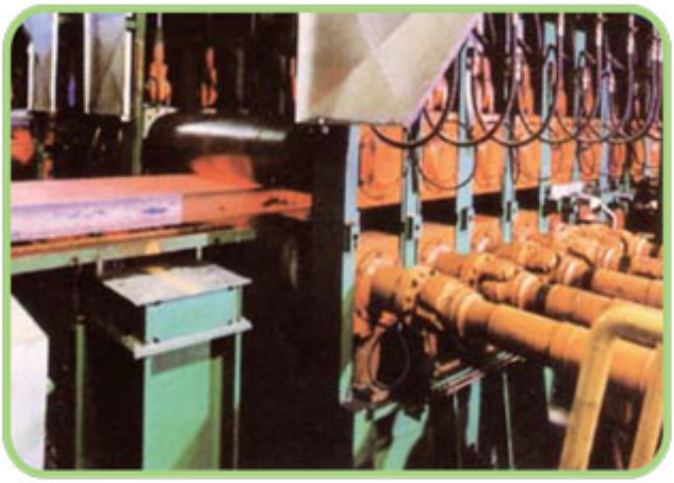
The universal shafts can be serviced by our specialized persons at the service station using the original spare parts. No servicing is considered for universal shafts of below 600 R.P.M. rotation at user's workshop except in urgent situations. For universal shafts of more than 600 R.P.M. rotation, adjustment must be made by the manufacturer.

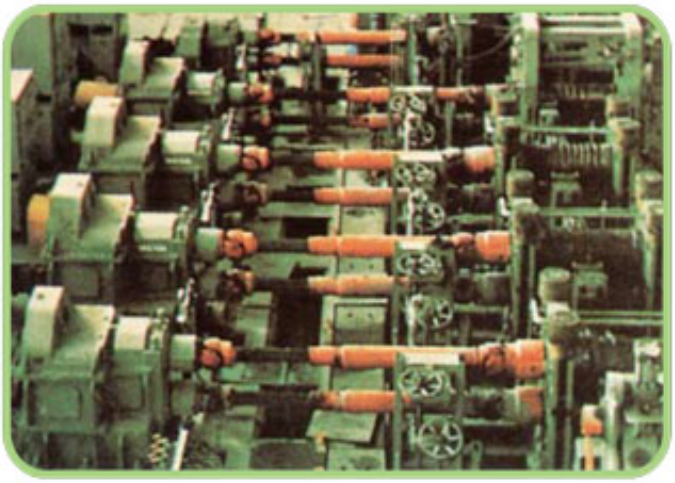
Cases of use





On rubber sheet machines in rubber plant





On pressing rollers in steel mill

T·Y·Gear

Since 1974

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