# AJAN Universal Joint



High Shock and Overload Capacity

Long Life

Heat Treated Alloy Steel Components

Minimal Lubrication Required

Virtually Backlash-Free

**Quick Delivery** 



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### The Renold Inc. Universal Joint

Renold Inc., a leader in power transmission equipment for over 90 years, offers a complete line of universal joints.

The universal joint is considered to be one of the oldest of all flexible couplings. It is commonly known for its use on automobiles and trucks. A universal joint in its simplest form consists of two shaft yokes at right angles to each other and a four point cross which connects the yokes. The cross rides inside the bearing cap assemblies, which are pressed into the yoke eyes.

Industrial applications operate continuously and with high torque loads. This demands maximum strength and long life of the universal joint components. The modern universal joint has become much more complex than its simple ancestor. The universal joints manufactured by Renold are made for demanding industrial applications.

Universal joints have several unique features that make them ideal for a variety of applications. Most significant is the ability of the universal joint to operate at high misalignment angles. Operating angles up to 15 degrees are not uncommon.

Another feature of the universal joint is the bearing and seal design that resists lubrication loss and contamination. This makes Renold Universal Joints suitable for applications where severe atmospheric conditions would put other couplings at a distinct disadvantage.

When compared to other high misalignment couplings, universal joints operate with negligible backlash or radial clearance. The difference can be significant on applications where backlash is critical.

Renold Universal Joint vokes are precisely engineered using the latest design technologies. They are manufactured as a one-piece, closed bearing eye design, assuring the highest degree of strength and minimum distortion under load.

The cross design is even more important and has received careful consideration through extensive computer analysis to match the strength characteristics of the voke.

Yokes and crosses are both precision machined from heat treated alloy steels. They are assembled with minimum clearance bearing units using the lastest in roller bearing technology including crowned rollers that minimize friction and provide long life.

The universal joint can be used as a single joint or it can be used in pairs. When used as a single joint, only angular misalignment is accommodated. Since nearly every installation requires the coupling to also accommodate offset misalignment, universal joints should be used in pairs. Using universal joints in pairs also corrects for non-uniform angular velocity caused by the rotational characteristics of a single joint.





# **Advantages and Design: Typical Applications**

### **Advantages and Features**

- Domestic manufacture
- High torque capacity
- Long bearing life
- · High operating angle capability
- One piece yoke and bearing housing construction
- Eliminates unnecessary bolted connections and serrations in yokes
- Heat treated alloy steel components
- Ideal loading across entire bearing length due to balanced deflection between yokes and cross
- Replaceable inner bearing race on size RA440 and larger significantly reducing cross-maintenance expenses
- Available in four basic types
- Technical support and engineering services available
- Extensive repair facility
- Special sizes and designs available upon request
- Large sizes available



### **Typical Applications**

Following is a partial list of applications for the Renold Universal Joint.

Agitators Packaging **Balancing Machines** Paper Mills - Calender Drives Blowers and Fans - Sizing and Press Compressors Rolls Conveyors

Cooling Tower Fans - Process Pumps Cranes and Hoists Plastic Manufacturing

- Couch Rolls

- Melt Pumps Crushers **Printing Presses** Farming Equipment

Pumps Generators - Irrigation Glass Manufacturing - Lift Lumber Mills - Sewage Marine Propulsion Railway Drives

Mining Equipment **Rubber Processing** Oil and Gas Mixers - Drilling - Calenders - Pumps Shredders

Textile Equipment

# **Metals Industry**

(Steel, Aluminum, Copper and Brass)

Bar and Rod Mills **Runout Tables** - Piercers Cold Reduction - Transfer Cars **Continuous Casters** - Structural Mills Hot Strip Mills Scale Breakers Levelers Shears Payoff Reels Side Trimmers - Pinch Rolls Straighteners - Coilers

- Brush Rolls Temper Mills - Bridles **Tension Reels** - Flatteners Tube Mills - Slitters Vertical Edgers Pipe Mills Wire Mills



# **Construction: Yoke Assembly and Bearing Design**

#### **Basic Designs**

The Renold Universal Joint is available in seven basic bearing designs:

#### 1000 Series

Yoke assembly parts furnished by domestic manufacturers.

**Sizes RA1310-RA1550:** Needle bearing design. Bearing caps are retained by snap rings.

**Sizes RA1610-RA1880:** Needle bearing design. Bearing caps are retained by bolts.

**Sizes RA1990:** Uses two rows of roller bearings. Bearing caps are retained by snap rings. Lube fitting in center of cross.

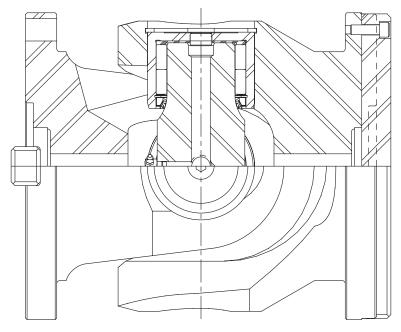
### 2000 Series

**Sizes RA058-RA100:** Needle bearing design. Lube fitting in center of cross.

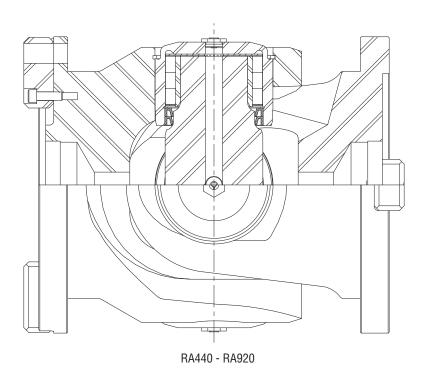
**Sizes RA120-RA225:** Uses two rows of roller bearings. Bearing caps are retained by snap rings. Lube fitting in center of cross.

**Sizes RA250-RA435:** Uses two rows of roller bearings Bearing caps are retained by snap rings. Lube fittings in center bearing cap is optional.

Sizes RA440-RA920: Uses three or more rows of roller bearings. Includes replaceable inner races in the bearing assemblies. Bearing caps are retained by large snap rings. Lube fittings are in each bearing cap.



RA250 - RA435







# **Selection Information and Speed Limits**

### I. Speed Limit Based on Limits of Mass Acceleration

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 [ RPM x A ].

To ensure smooth running of the universal joint, the mass acceleration torque must not be allowed to exceed the limits shown in Table 1.

### II. Speed Limit Based on Lateral Critical Speed

In applications where long lengths of shafts are required, the speed is restricted by the lateral critical speed of the center section. This speed is a function of the center tube diameter wall thickness, and the effective length. The maximum operating speed must be less than the lateral critical speed Nc shown in Table 2.

#### NOTE

Allowable Operating Speed =  $Nc \times .75$ .

In many applications, operation at 1/2 critical speed will also create unacceptable vibration. For these applications the operating speed should be 8% above or below 50% of the maximum indicated.

For flange-to-flange lengths greater than shown, or if allowable speed is exceeded, contact Renold.

#### III. Balancing

All standard universal joints under 300 RPM are supplied unbalanced. Between 300-850 RPM they are balanced if required. Consult factory for further information. Over 850 RPM all universal joints are normally supplied balanced. Please consult the factory for special balancing requirements.

#### Table 1

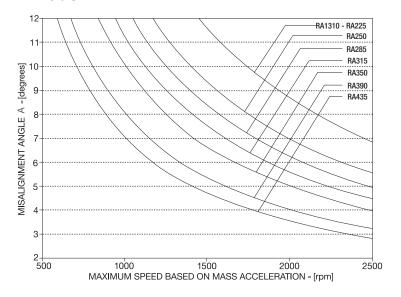
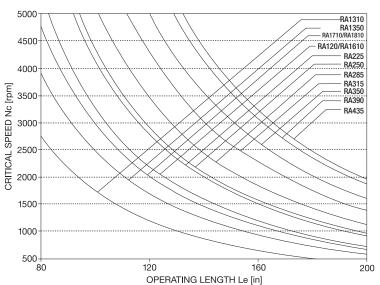


Table 2



The speed limits on this page are only a guide. The actual limits are determined by the characteristics of the system in which the universal joint is installed.



# **Selection Procedure**

See pages 26-27 for Application Data sheets for easy selection.

Four types of torque ratings are given for each joint size.

Endurance torque (T<sub>e</sub>) is the normal rating for fully reversing torque based on material strength.

One way endurance torque (Tow) is the normal rating for pulsating one way torque based on material strength.

Life torque (T<sub>L</sub>) is the bearing life rating of the universal joint. This torque is based on the B-10 life of the universal joint bearings. The life torque values listed are based on 5000 hours B-10 bearing life at 3° misalignment and 100 RPM. B-10 life is defined as the minimum life expectancy for a 90% probability of survival. Typically the average actual operating life of the bearings is 5X the calculated B-10 life.

Peak torque (T<sub>p</sub>) is the maximum allowable torque based on the yield strength capacity of the joint.

The torque ratings are based on material strength. When approaching these limits the capacity of the desired flange connection should be verified. When the selection torque (T<sub>s</sub>) approaches the endurance torque (Te) or when the maximum torque approaches the peak torque capacity (Tp) of the universal joint, integral face pads are recommended. The number of pads and bolts are customized on a per application basis. Hirth radial teeth are also available on a per application basis.

#### **Universal Joint Selection**

I. Calculate application torque (T<sub>a</sub>) and selection torque (T<sub>s</sub>).

$$T_a = \frac{HP \times 63025}{N}$$
 (lb. x in.)

$$T_a = \frac{KW \times 9550}{N}$$
 (Nm)

N = Speed (RPM)

 $T_s$  = Selection Torque =  $T_a$  x Service Factor (Table 3)

 $T_s$  must be less than  $T_e$  for reversing torque applications or  $T_{ow}$  for one way pulsating torque applications.

II. Check to see if life is sufficient.

**Lh** = 
$$\frac{1.5 \times 10^6}{A \times N} \left[ \frac{T_L}{T_a} \right]_{\frac{10}{3}}$$

Where:

Lh = B-10 Life in Hours

A = Operating Angle in Degrees

N = Speed (RPM)

T<sub>1</sub> = Life Torque

T<sub>a</sub> = Application Torque

III. Duty Cycle: In applications where the torque, speed and operating angle vary predictably during a typical load cycle or operational sequence, a duty cycle can be determined. First the load cycle must be analyzed and divided into groups of fixed combinations of torque, speed and operating angle. These groups represent percentages of the total operating time of the load cycle. Life expectancy can then be calculated using Miner's Theory, which takes into account the cumulative effect resulting from operating at varying conditions.

The total life expectancy can be calculated using the following equation:

$$\label{eq:total Life Expectancy} \begin{split} & \text{Total Life} \\ & \text{Expectancy} = \frac{1}{\frac{N_1}{L_1} + \frac{N_2}{L_2} + \frac{N_3}{L_3} + \cdots + \frac{N_m}{L_m}} \end{split}$$

Where:

**N**<sub>4</sub> = fraction of total, time at operating condition 1

L, = life expectancy at operating condition 1 (hours)

**m** = total number of operating conditions

IV. Determine Peak Torque conditions. T<sub>p</sub> must exceed the maximum operating torque.

V. Other considerations: There are many other items that can determine the size of a universal joint. These include:

1. Diameter and length limitations.

2. Bore size (see page 19).

3. Equipment restrictions on forces and moments.

4. Speed limits (see Tables 1 and 2)

a. due to mass acceleration as a function of misalignment

b. critical speed of center shaft

Telescopic splines are available on ST and FT designs. The splined axial travel sections are required to accommodate movement of the driven end such as a roll position change or axle jounce. SF and FF shaft are properly selected for applications where the roll end has relatively small movements of the driven side along with a clearance or slip fit roll end connection. The amount of required axial movement can be calculated by multiplying the centerline to centerline of the universal joint yokes by 1 minus the cosine of the operating angle for each position.

Nitrided or coated splines are available on request.

Longer or shorter travel is available. Consult Renold.



Axial travel of the telescopic spline on ST and FT designs under torque results in axial forces being applied to the support bearings. These forces are a function of the spline coefficient of friction, operating torque, operating angle, and spline pitch diameter per the following formula.

F axial = 
$$\frac{2T(\mu)(COS A)}{PD}$$

F axial = Axial Force

**T** = Operating Torque

 μ = Coefficient of Friction
 (.11 to .15 for lubricated steel on steel, contact Renold

for other coatings)

A = Operating Angle (degrees)

**PD** = Spline Pitch Diameter

If you have unusual conditions, please supply details with your inquiry. See pages 26-27 for required Selection Data.

#### **Example:**

One way cold mill with a 1800 HP motor at 400 RPM and a 2:1 reducer ratio with a 50% torque split requires two universal joints to operate at the following conditions:

900 HP per universal joint

200 RPM

3° Misalignment

1.5 Service Factor

12.5" Maximum O.D.

8.25" Bores

53" Shaft Separation

250% Peak Torque Factor

It is important and necessary to understand the operational characteristics of universal joints before making a selection. See pages 22 and 23. If you have any questions about your application, please contact Renold.

**Table 3: Service Factors** 

Load	Driven Equipment	Continuous Non-Reversing Drivers AC Motors Turbines	Reversing Drivers D.C. Motors Reciprocating Engines
Constant Torque	Generating Centrifugal Pumps Conveyors	1	1.50
Light Shock	Continuous Casters Light Fans Machine Tools Woodworking Machinery Paper Mill Equipment Bar & Rod Mills	1.25	2
Medium Shock	Compressors Pumps Fans Farming Equipment Cold Mills & Auxiliary Equipmen Presses	1.50 nt	2.25
Heavy Shock	Traction & Locomotive Drives Mixers Crane Drives Mining Equipment Rapid Transit Drives Hot Rolling Mill Drives Runout Tables Feed Roll Drives	2	3
Very Heavy Shock	Ore Crushers Scale Breakers Feed Roll Drives	3	5

### Step 1: Calculate Application Torque

$$T_a = \frac{900 \text{ HP x } 63,025}{200 \text{ RPM}} = 283,610 \text{ in.-lbs.}$$

 $T_s = 283,610 \text{ in.-lbs.} \times 1.5 = 425,420 \text{ in.-lbs.}$ 

Preliminary Selection: RA315 (Tow = 621,300 in.-lbs.)

#### Step II. Check Life

Lh = 
$$\left(\frac{1.5 \times 10^6}{3 \times 200}\right) \left(\frac{364,400}{283,610}\right) \frac{10}{3} = 5,765 \text{ hr. B-10 life}$$

Step III. Duty Cycle - not applicable.

Step IV: Peak Torque

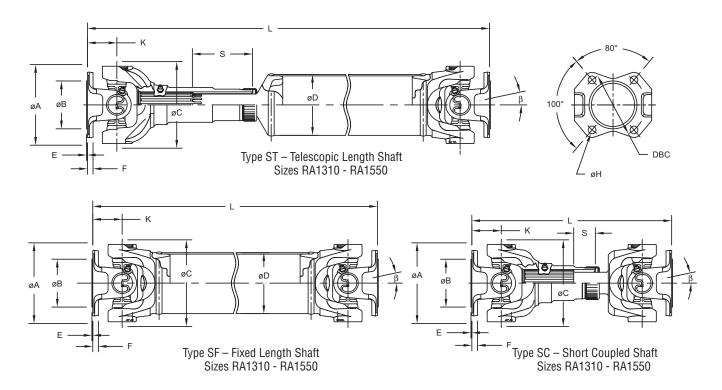
 $283,610 \text{ in.-lbs.} \times 2.5 = 709,025 \text{ in.-lbs.}$ 

Step V: Check diameter limits, bore size, and speed limits.

Selection: RA315 with 12.38" O.D. design 2 flange adaptors.

# **Engineering Data Series 1000**

# Sizes RA1310 - RA1550



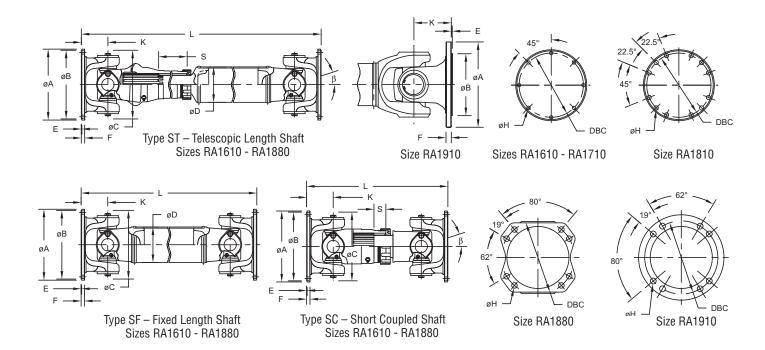
Size	RA	1310	R/	1350	R/	1410	RA	1480	RA	1550
Torque Ra	tings				,					
	Lb.in.	Nm	Lb.in.	Nm	Lb.in.	Nm	Lb.in.	Nm	Lb.in.	Nm
T <sub>e</sub>	9,419	1,064	13,275	1,500	13,275	1,500	15,171	1,714	19,596	2,214
T <sub>ow</sub>	13,187	1,490	18,585	2,100	18,585	2,100	21,240	2,400	27,435	3,100
T∟	4,800	542	8,160	922	9,840	1,112	13,200	1,492	16,800	1,898
Tp	19,200	2,169	27,120	3,064	32,400	3,661	39,960	4,515	52,800	5,966
Dimension	nal Data	(inches a	nd millim	eters exc	ept where	e noted)				
ß	_	20°	2	0°	2	0°	2	2°	2	2°
ß (SC)	1	5°	3	3°	8	3°	3	3°	į	ō°
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
Α	3.88	98.6	4.62	117.3	4.62	117.3	5.88	149.4	5.88	149.4
В	2.38	60.5	2.75	69.9	2.75	69.9	3.75	95.3	3.75	95.3
С	3.75	95.3	4.25	108.0	4.69	119.1	4.81	122.2	5.63	143.0
D <sup>(1)</sup>	2.50	63.5	3	76.2	3.50	88.9	3.50	88.9	3.50	88.9
Е	0.06	1.5	0.06	1.5	0.06	1.5	0.06	1.5	0.06	1.5
F	0.38	9.7	0.38	9.7	0.38	9.7	0.38	9.7	0.38	9.7
K	1.38	35.1	1.56	39.6	1.69	42.9	2	50.8	2	50.8
K (SC)	1.38	35.1	1.56	39.6	1.69	42.9	1.50	38.1	2	50.8
DBC	3.12	79.2	3.75	95.3	3.75	95.3	4.75	120.7	4.75	120.7
Bolt Qty.	4	4	4	4	4	4	4	4	4	4
Н	0.38	9.7	0.44	11.2	0.44	11.2	0.50	12.7	0.50	12.7
Minimum	Length L	. <sup>(2)</sup> / Leng	th Compe	nsation S	3					
ST L	13	330.2	14.88	378.0	14.13	358.9	15.25	387.4	15.38	390.7
S	3.06	77.7	3.62	91.9	3.47	88.1	2.50	63.5	2.50	63.5
SF L	7.67	194.8	8.59	218.2	9.03	229.4	10.03	254.8	10.80	274.3
SC L	8.88	225.6	9.50	241.3	9.50	241.3	8.50	215.9	9.75	247.7
S	1.25	31.8	0.75	19.1	0.75	19.1	1	25.4	1	25.4

Special tube diameters available upon request
 L is minimum for ST and SF design
 Longer/shorter length compensation available upon request. Popular flange yoke configurations shown, special designs available upon request.



# **Engineering Data Series 1000**

# Sizes RA1610 - RA1910

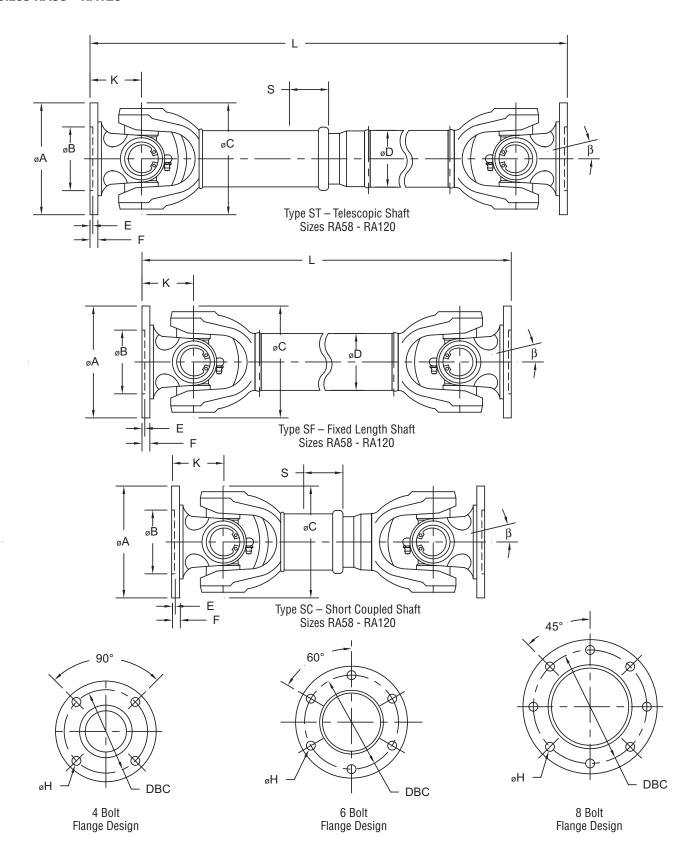


Size	R/	A1610	R/	1710	RA	1810	RA	1880	RA <sup>-</sup>	1910
Torque Ra	tings									
	Lb.in.	Nm	Lb.in.	Nm	Lb.in.	Nm	Lb.in.	Nm	Lb.in.	Nm
T <sub>e</sub>	29,521	3,336	39,193	4,429	49,939	5,643	88,816	10,036	100,005	11,300
T <sub>ow</sub>	41,330	4,670	54,870	6,200	69,915	7,900	124,343	14,050	140,007	15,820
TL	26,400	2,983	35,160	3,973	45,600	5,153	60,000	6,780	124,103	14,023
Tp	78,000	8,814	96,000	10,847	,	- /	192,000	21,695	243,300	27,492
Dimension	nal Data	(inches a			ept where	noted)				
ß	_	.6°	_	2°	3	<u> </u>	_	2°	_	5°
ß (SC)	3	3°	3	3°	1:	2°	8	3°	2	5°
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
Α	6.88	174.8	8	203.2	8	203.2	9.63	244.6	9.63	244.6
В	6.62	168.1	7.75	196.9	7.75	196.9	7	177.8	7	177.8
С	7	177.8	7.75	196.9	9.13	231.9	8.63	219.2	8.03	204.0
D <sup>(1)</sup>	3.50	88.9	4	101.6	4.50	114.3	4.50	114.3	5.50	139.7
Е	0.06	1.5	0.06	1.5	0.06	1.5	0.09	2.3	0.09	2.3
F	0.38	9.7	0.38	9.7	0.38	9.7	0.63	16.0	0.59	15.0
K	2.75	69.9	3	76.2	3.38	85.9	3.50	88.9	4.33	110.0
K (SC)	1.88	47.8	2	50.8	2.59	65.8	2.50	63.5	4.33	110.0
DBC	6.13	155.7	7.25	184.2	7.25	184.2	8.25	209.6	8.25	209.6
Bolt Qty.	8	8	8	8	12	12	8	8	8	8
Н	0.38	9.7	0.38	9.7	0.44	11.2	0.63	16.0	0.63	16.0
Minimum	Length L	(2) / Leng	th Compe	nsation S	<b>S</b>					
ST L	22.94	582.7	23.44	595.4	24.80	629.9	24.81	630.2	27.56	700.0
S	4.88	124.0	3.88	98.6	3.38	85.9	3.50	88.9	2.95	74.9
SF L	13.81	350.8	14.37	365.0	16.30	414.0	19.31	490.5	21.43	544.3
SC L	9.12	231.6	10.62	269.7	13.40	340.4	13.62	345.9	21.46	545.1
S	0.75	19.1	0.75	19.1	1.12	28.4	1	25.4	1.58	40.1



<sup>©</sup> Special tube diameters available upon request
© L is minimum for ST and SF designs
Longer/shorter length compensation available upon request. Popular flange yoke configurations shown, special designs available upon request.

# **Sizes RA58 - RA120**



Size		RA	58			RA	65			RA	75	
		n/A	30			nA	05			nA	13	
Torque Ra												
	Lk	o.in.	N	lm	Lb	.in.	1	Vm	Lb.		Nı	
Te		037		17	1,3			56	2,8		32	22
T <sub>ow</sub>	1,	556	1	76	2,0	73	2	.34	4,2	78	48	33
TL	1,	319	1	49	2,0	)53	2	:32	3,4	78	39	93
Tp	2,	213	2	50	4,6	602	5	520	10,6	320	1,2	200
	nal Data (in	ches and m	illimeters	except who	ere noted)							
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
ß	30	)°	2	.5°	30	)°	2	20°	3	0°	18	3°
A	2.28	58	2.56	65	2.56	65	2.95	75	2.95	75	3.54	90
В	1.18	30	1.38	35	1.38	35	1.65	42	1.65	42	1.85	47
C	2.05	52	2.05	52	2.36	60	2.36	60	2.76	70	2.76	70
D <sup>(1)</sup>	1.12	28	1.12	28	1.25	32	1.25	32	1.56	40	1.56	40
E	0.06	1.5	0.07	1.7	0.07	1.7	0.09	2.2	0.10	2.2	0.10	2.5
F	0.14	3.5	0.16	4	0.16	4	0.22	5.5	0.22	5.5	0.24	6
K	1.18	30	1.18	30	1.26	32	1.26	32	1.42	36	1.42	36
DBC	1.85	47	2.05	52	2.05	52	2.44	62	2.44	62	2.93	74.5
Bolt Qty.	4	4	4	4	4	4	6	6	6	6	4	4
Н	0.20	5	0.24	6	0.24	6	0.24	6	0.24	6	0.31	8
Minimum	Length L(2)	Length Co	mpensatio	n S								
	in	ich	n	nm	in	ch	m	ım	inc	h	m	m
ST L/S	10.5	5/1.57	268	3/40	11.42	2/2.36	290	0/60	11.81	/1.38	300	/35
SF L	6.	.30	1	60	6.	50	1	65	7.8	 37	20	00
SC L/S		0/.79		5/20		/.79		)/20	7.87	/.98	200	
SC L/S		9/.98		5/25	7.87			0/30	8.86/		225	
SC L/S		3/.98		5/25	8.86			0/30	9.84/		250	
SC L/S		6/.98		5/25	9.25			5/30	10.63		270	
00 00	0.40	37.30	210	1120	0.20/	1.10	200	0/00	10.00	71.00	210	,,00
Size		RA	90			RA	100			RA	120	
Torque Ra	tinas											
Torquo ria		in.	N	m	Lb	in		lm	Lh	o.in.	Nr	m
T <sub>e</sub>		195		00	8,8			000		275	1,5	
T <sub>ow</sub>		673		80	12,			100		585	2,1	
I OW					9,0			026		381	-	
						<i>1</i> 00			1 10.	30 I		
TL	5,6	682	6-								188	
T <sub>L</sub>	5,6 19,	682 470	2,2	200	26,	550		000		498	4,3	
T <sub>L</sub>	5,6 19, nal Data (in	682 470 <b>ches and m</b>	2,2 illimeters	200 except whe	26, ere noted)		3,0	000	38,	498	4,3	50
T <sub>L</sub> T <sub>p</sub> Dimension	5,6 19, nal Data (inch	682 470 <b>ches and m</b> mm	2,2 iillimeters of inch	200 except whe	26, ere noted) inch	mm	3,0	000 mm	38,	498 mm	4,3	50 mm
T <sub>L</sub> T <sub>p</sub> Dimension	5,6 19, nal Data (inch inch	682 470 <b>ches and m</b> mm	2,2 illimeters of inch	200 except whe	26, ere noted) inch	mm	3,0	000	38, inch	498	4,3 inch	50 mm
T <sub>L</sub> T <sub>p</sub> Dimension  ß A	5,6 19, nal Data (inch inch 20 3.54	682 470 <b>ches and m</b> mm 0° 90	2,2 illimeters ( inch  1 3.94	except when mm 8° 100	26, ere noted) inch 20 3.94	mm )° 100	3,0 inch 4.72	000 mm 8° 120	38, inch 2 4.72	498 mm 20° 120	4,3 inch 18 5.91	50 mm 3° 150
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B	5,6 19, nal Data (inch inch 20 3.54 1.85	682 470 <b>ches and m</b> mm 0° 90 47	2,2 illimeters ( inch 1 3.94 2.24	200 except whe mm 8° 100 57	26, ere noted) inch 20 3.94 2.24	mm 0° 100 57	3,0 inch 4.72 2.95	mm 8° 120 75	38, inch 2 4.72 2.95	mm 120 75	4,3 inch	mm 3° 150 90
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C	5,6 19, nal Data (inch inch 20 3.54	682 470 <b>ches and m</b> mm 0° 90 47 86	2,2 illimeters ( inch  1 3.94	200 except whe mm 8° 100 57 86	26, ere noted) inch 20 3.94	mm 0° 100 57 98	3,0 inch 4.72 2.95 3.86	mm 8° 120 75 98	38, inch 2 4.72 2.95 4.53	498 mm 20° 120 75 115	4,3 inch 18 5.91 3.54 4.53	50 mm 3° 150
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B	5,6 19, nal Data (inch inch 20 3.54 1.85	682 470 <b>ches and m</b> mm 0° 90 47	2,2 illimeters ( inch 1 3.94 2.24	200 except whe mm 8° 100 57	26, ere noted) inch 20 3.94 2.24	mm 0° 100 57	3,0 inch 4.72 2.95	mm 8° 120 75	38, inch 2 4.72 2.95	mm 120 75	4,3 inch 18 5.91 3.54	mm 3° 150 90
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C	5,6 19, mal Data (inch inch 20 3.54 1.85 3.39	682 470 <b>ches and m</b> mm 0° 90 47 86	2,2 illimeters ( inch 1 3.94 2.24 3.39	200 except whe mm 8° 100 57 86	26, ere noted) inch 3.94 2.24 3.86	mm 0° 100 57 98	3,0 inch 4.72 2.95 3.86	mm 8° 120 75 98	38, inch 2 4.72 2.95 4.53	498 mm 20° 120 75 115	4,3 inch 18 5.91 3.54 4.53	mm 3° 150 90
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D <sup>(1)</sup>	5,6 19, nal Data (inch inch 20 3.54 1.85 3.39 2	682 470 <b>ches and m</b> mm 0° 90 47 86 50	2,2 illimeters ( inch 1 3.94 2.24 3.39 2	except when mm 8° 100 57 86 50	26, ere noted) inch 20 3.94 2.24 3.86 2	mm 100 57 98 50	3,0 inch 4.72 2.95 3.86 2	mm 8° 120 75 98 50	38, inch 2 4.72 2.95 4.53 2.35	mm 10° 120 75 115 60	4,3 inch 18 5.91 3.54 4.53 2.35	mm 3° 150 90 115 60
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D(1) E	5,6 19, nal Data (inch inch 20 3.54 1.85 3.39 2 0.10 0.24	682 470 <b>ches and m</b> mm 0° 90 47 86 50 2.5 6	2,2 illimeters of inch 1 3.94 2.24 3.39 2 0.10 0.28	2000  except whe mm  8°  100  57  86  50  2.5  7	26, ere noted) inch 20 3.94 2.24 3.86 2 0.10 0.28	mm 0° 100 57 98 50 2.5	3,0 inch 4.72 2.95 3.86 2 0.10 0.31	mm 8° 120 75 98 50 2.5 8	38, inch 2 4.72 2.95 4.53 2.35 0.10 0.31	mm 120 75 115 60 2.5 8	4,3 inch 5.91 3.54 4.53 2.35 0.12 0.35	mm 3° 150 90 115 60 3
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D <sup>(1)</sup> E F	5,6 19, nal Data (inch inch 20 3.54 1.85 3.39 2 0.10 0.24 1.65	682 470 <b>ches and m</b> mm 0° 90 47 86 50 2.5 6 42	2,2 illimeters of inch 1 3.94 2.24 3.39 2 0.10 0.28 1.65	2000  except who mm  8°  100  57  86  50  2.5  7  42	26, ere noted) inch 20 3.94 2.24 3.86 2 0.10 0.28 1.81	mm  100  57  98  50  2.5  7  46	3,0 inch 4.72 2.95 3.86 2 0.10 0.31 1.81	mm 8° 120 75 98 50 2.5 8 46	38, inch 2 4.72 2.95 4.53 2.35 0.10 0.31 2.36	mm 0° 120 75 115 60 2.5 8 60	4,3 inch 18 5.91 3.54 4.53 2.35 0.12 0.35 2.36	mm 3° 150 90 115 60 3 9 60
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D <sup>(1)</sup> E F K DBC	5,6 19, nal Data (inch inch 20 3.54 1.85 3.39 2 0.10 0.24 1.65 2.93	682 470 <b>ches and m</b> mm  0°  90  47  86  50  2.5  6  42  74.5	2,2 illimeters of inch 1 3.94 2.24 3.39 2 0.10 0.28 1.65 3.31	2000  except who mm  8°  100  57  86  50  2.5  7  42  84	26, ere noted) inch 20 3.94 2.24 3.86 2 0.10 0.28 1.81 3.31	mm  100  57  98  50  2.5  7  46  84	3,0 inch 4.72 2.95 3.86 2 0.10 0.31 1.81 4	mm 8° 120 75 98 50 2.5 8 46 101.5	38, inch 2 4.72 2.95 4.53 2.35 0.10 0.31 2.36 4	mm 0° 120 75 115 60 2.5 8 60 101.5	4,3 inch 5.91 3.54 4.53 2.35 0.12 0.35 2.36 5.12	mm 3° 150 90 115 60 3 9 60 130
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D <sup>(1)</sup> E F K DBC Bolt Qty.	5,6 19, nal Data (inch inch 20 3.54 1.85 3.39 2 0.10 0.24 1.65 2.93 4	682 470 <b>ches and m</b> mm  9°  90  47  86  50  2.5  6  42  74.5  4	2,2 illimeters of inch 1 3.94 2.24 3.39 2 0.10 0.28 1.65 3.31 6	2000  except who mm  8°  100  57  86  50  2.5  7  42  84  6	26, ere noted) inch 20 3.94 2.24 3.86 2 0.10 0.28 1.81 3.31 6	mm  100  57  98  50  2.5  7  46  84  6	3,0 inch 4.72 2.95 3.86 2 0.10 0.31 1.81 4	mm 8° 120 75 98 50 2.5 8 46 101.5 8	38, inch 2 4.72 2.95 4.53 2.35 0.10 0.31 2.36 4	mm 0° 120 75 115 60 2.5 8 60 101.5	4,3 inch 5.91 3.54 4.53 2.35 0.12 0.35 2.36 5.12 8	mm 3° 150 90 115 60 3 9 60 130 8
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D <sup>(1)</sup> E F K DBC Bolt Qty. H	5,6 19, nal Data (inch inch 20 3.54 1.85 3.39 2 0.10 0.24 1.65 2.93 4 0.31	682 470 <b>ches and m</b> mm  0°  90  47  86  50  2.5  6  42  74.5  4  8	2,2 illimeters of inch 1 3.94 2.24 3.39 2 0.10 0.28 1.65 3.31 6 0.31	2000  except who mm  8°  100  57  86  50  2.5  7  42  84  6  8	26, ere noted) inch 20 3.94 2.24 3.86 2 0.10 0.28 1.81 3.31	mm  100  57  98  50  2.5  7  46  84	3,0 inch 4.72 2.95 3.86 2 0.10 0.31 1.81 4	mm 8° 120 75 98 50 2.5 8 46 101.5	38, inch 2 4.72 2.95 4.53 2.35 0.10 0.31 2.36 4	mm 0° 120 75 115 60 2.5 8 60 101.5	4,3 inch 5.91 3.54 4.53 2.35 0.12 0.35 2.36 5.12	mm 3° 150 90 115 60 3 9 60 130
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D <sup>(1)</sup> E F K DBC Bolt Qty. H	5,6 19, nal Data (inch inch 20 3.54 1.85 3.39 2 0.10 0.24 1.65 2.93 4 0.31 Length L <sup>(2)</sup>	682 470 ches and m mm 0° 90 47 86 50 2.5 6 42 74.5 4 8 / Length Co	2,2 illimeters of inch 1 3.94 2.24 3.39 2 0.10 0.28 1.65 3.31 6 0.31 mpensatio	2000  except whee mm  8°  100  57  86  50  2.5  7  42  84  6  8  on S	26, ere noted) inch 20 3.94 2.24 3.86 2 0.10 0.28 1.81 3.31 6 0.31	mm 0° 100 57 98 50 2.5 7 46 84 6 8	3,0 inch 4.72 2.95 3.86 2 0.10 0.31 1.81 4 8 0.31	mm 8° 120 75 98 50 2.5 8 46 101.5 8	38, inch 2 4.72 2.95 4.53 2.35 0.10 0.31 2.36 4 8 0.31	498  mm 100° 120 75 115 60 2.5 8 60 101.5 8	4,3 inch 18 5.91 3.54 4.53 2.35 0.12 0.35 2.36 5.12 8 0.39	50  mm 3° 150 90 115 60 3 9 60 130 8 10
T <sub>L</sub> T <sub>p</sub> Dimension	5,6 19, nal Data (inch inch 20 3.54 1.85 3.39 2 0.10 0.24 1.65 2.93 4 0.31 Length L <sup>(2)</sup> in	682 470 ches and m mm 0° 90 47 86 50 2.5 6 42 74.5 4 8 / Length Co	2,2 illimeters of inch 1 3.94 2.24 3.39 2 0.10 0.28 1.65 3.31 6 0.31 cmpensation	2000  except who mm  8°  100  57  86  50  2.5  7  42  84  6  8  on S	26, ere noted) inch 20 3.94 2.24 3.86 2 0.10 0.28 1.81 3.31 6 0.31	mm 0° 100 57 98 50 2.5 7 46 84 6 8	3,0 inch 4.72 2.95 3.86 2 0.10 0.31 1.81 4 8 0.31	mm 8° 120 75 98 50 2.5 8 46 101.5 8	38, inch 2 4.72 2.95 4.53 2.35 0.10 0.31 2.36 4 8 0.31	mm 0° 120 75 115 60 2.5 8 60 101.5 8 8	4,3 inch 5.91 3.54 4.53 2.35 0.12 0.35 2.36 5.12 8 0.39	50  mm 3° 150 90 115 60 3 9 60 130 8 10
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D(1) E F K DBC Bolt Qty. H Minimum	5,6 19, mal Data (inch inch 20 3.54 1.85 3.39 2 0.10 0.24 1.65 2.93 4 0.31 Length L <sup>(2)</sup> in 13.70	682 470 ches and m mm 0° 90 47 86 50 2.5 6 42 74.5 4 8 / Length Co	2,2 illimeters of inch 1 3.94 2.24 3.39 2 0.10 0.28 1.65 3.31 6 0.31 mpensatio	2000  except whee mm 8° 100 57 86 50 2.5 7 42 84 6 8 on S	26, ere noted) inch 20 3.94 2.24 3.86 2 0.10 0.28 1.81 3.31 6 0.31	mm 0° 100 57 98 50 2.5 7 46 84 6 8	3,0 inch 4.72 2.95 3.86 2 0.10 0.31 1.81 4 8 0.31	mm 8° 120 75 98 50 2.5 8 46 101.5 8 8	38, inch 2 4.72 2.95 4.53 2.35 0.10 0.31 2.36 4 8 0.31 inc 18.52	mm 20° 120 75 115 60 2.5 8 60 101.5 8 8	4,3 inch 18 5.91 3.54 4.53 2.35 0.12 0.35 2.36 5.12 8 0.39	50  mm 3° 150 90 115 60 3 9 60 130 8 10
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D(1) E F K DBC Bolt Qty. H Minimum  ST L/S SF L	5,6 19, nal Data (inch inch 20 3.54 1.85 3.39 2 0.10 0.24 1.65 2.93 4 0.31 Length L <sup>(2)</sup> (inch 13.70	682 470 ches and m mm 0° 90 47 86 50 2.5 6 42 74.5 4 8 / Length Co	2,2 illimeters of inch 1 3.94 2.24 3.39 2 0.10 0.28 1.65 3.31 6 0.31 cmpensatio	2000  except who mm  8°  100  57  86  50  2.5  7  42  84  6  8  on S  nm  3/40  16	26, ere noted) inch 20 3.94 2.24 3.86 2 0.10 0.28 1.81 3.31 6 0.31	mm 0° 100 57 98 50 2.5 7 46 84 6 8	3,0 inch 4.72 2.95 3.86 2 0.10 0.31 1.81 4 8 0.31	mm 8° 120 75 98 50 2.5 8 46 101.5 8 8	38, inch 2 4.72 2.95 4.53 2.35 0.10 0.31 2.36 4 8 0.31 inc 18.52 11.	mm 10° 120 75 115 60 2.5 8 60 101.5 8 8 ch /2.36	4,3 inch 18 5.91 3.54 4.53 2.35 0.12 0.35 2.36 5.12 8 0.39 m 473 30	mm 3° 150 90 115 60 3 9 60 130 8 10 mm 6/60 01
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D(1) E F K DBC Bolt Qty. H Minimum  ST L/S SF L SC L/S	5,6 19, nal Data (inch inch 20 3.54 1.85 3.39 2 0.10 0.24 1.65 2.93 4 0.31 Length L <sup>(2)</sup> / in 13.7(	682 470 ches and m mm 0° 90 47 86 50 2.5 6 42 74.5 4 8 / Length Co	2,2 iillimeters of inch 1 3.94 2.24 3.39 2 0.10 0.28 1.65 3.31 6 0.31 impensation m 344 2 223	2000  except whee mm  8°  100  57  86  50  2.5  7  42  84  6  8  on S  nm  3/40  16  5/25	26, ere noted) inch 20 3.94 2.24 3.86 2 0.10 0.28 1.81 3.31 6 0.31 inch 14.72 9.1	mm  0°  100  57  98  50  2.5  7  46  84  6  8  ch  7/1.57	3,0 inch 4.72 2.95 3.86 2 0.10 0.31 1.81 4 8 0.31	mm 8° 120 75 98 50 2.5 8 46 101.5 8 8 1/40 5/30	38, inch 2 4.72 2.95 4.53 2.35 0.10 0.31 2.36 4 8 0.31 inc 18.52 11. 12.80	498  mm  10°  120  75  115  60  2.5  8  60  101.5  8  8  8  8  8  7/2.36	4,3 inch 18 5.91 3.54 4.53 2.35 0.12 0.35 2.36 5.12 8 0.39 m 473 30 325	mm 3° 150 90 115 60 3 9 60 130 8 10 mm 6/60 01
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D(1) E F K DBC Bolt Qty. H Minimum  ST L/S SF L SC L/S SC L/S	5,6 19, nal Data (inch inch 20 3.54 1.85 3.39 2 0.10 0.24 1.65 2.93 4 0.31 Length L <sup>(2)</sup> in 13.70 8.86	682 470 ches and m mm 9° 90 47 86 50 2.5 6 42 74.5 4 8 / Length Co	2,2 illimeters of inch 1 3.94 2.24 3.39 2 0.10 0.28 1.65 3.31 6 0.31 cmpensation m 344 22 226 256	2000  except who mm  8°  100  57  86  50  2.5  7  42  84  6  8  on S  mm  3/40  16  5/25  0/40	26, ere noted) inch 20 3.94 2.24 3.86 2 0.10 0.28 1.81 3.31 6 0.31 inch 14.72 9.1 10.04 11.02	mm  100  57  98  50  2.5  7  46  84  6  8  ch  7/1.57  84  7/1.18	3,0 inch 14.72 2.95 3.86 2 0.10 0.31 1.81 4 8 0.31	mm 8° 120 75 98 50 2.5 8 46 101.5 8 8 mm 4/40 50 5/30 )/40	38, inch 2 4.72 2.95 4.53 2.35 0.10 0.31 2.36 4 8 0.31 inc 18.52 11. 12.80 14.17	mm 10° 120 75 115 60 2.5 8 60 101.5 8 8 8 8 8 7/2.36	4,3 inch 18 5.91 3.54 4.53 2.35 0.12 0.35 2.36 5.12 8 0.39 m 473 30 325 360	mm 3° 150 90 115 60 3 9 60 130 8 10 mm //60 01 //35
T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D(1) E F K DBC Bolt Qty. H Minimum  ST L/S SF L SC L/S	5,6 19, nal Data (inch inch 20 3.54 1.85 3.39 2 0.10 0.24 1.65 2.93 4 0.31 Length L <sup>(2)</sup> in 13.70 8.86 9.84 11.02	682 470 ches and m mm 0° 90 47 86 50 2.5 6 42 74.5 4 8 / Length Co	2,2 iillimeters of inch 1 3.94 2.24 3.39 2 0.10 0.28 1.65 3.31 6 0.31 cmpensation m 344 22 226 256 286	2000  except whee mm  8°  100  57  86  50  2.5  7  42  84  6  8  on S  nm  3/40  16  5/25	26, ere noted) inch 20 3.94 2.24 3.86 2 0.10 0.28 1.81 3.31 6 0.31 inch 14.72 9.0 10.04 11.02 12.20	mm  100  57  98  50  2.5  7  46  84  6  8  ch  7/1.57  84  7/1.18	3,0 inch 4.72 2.95 3.86 2 0.10 0.31 1.81 4 8 0.31  mm 374 2.258 2.80 3.10	mm 8° 120 75 98 50 2.5 8 46 101.5 8 8 1/40 5/30	38, inch 2 4.72 2.95 4.53 2.35 0.10 0.31 2.36 4 8 0.31 inc 18.52 11. 12.80	mm 10° 120 75 115 60 2.5 8 60 101.5 8 8 8 8 8 7/2.36	4,3 inch 18 5.91 3.54 4.53 2.35 0.12 0.35 2.36 5.12 8 0.39  m 473 30 325 360 400	mm 3° 150 90 115 60 3 9 60 130 8 10 mm //60 01 //35

12.20/1.57

SC L/S

310/40



430/60

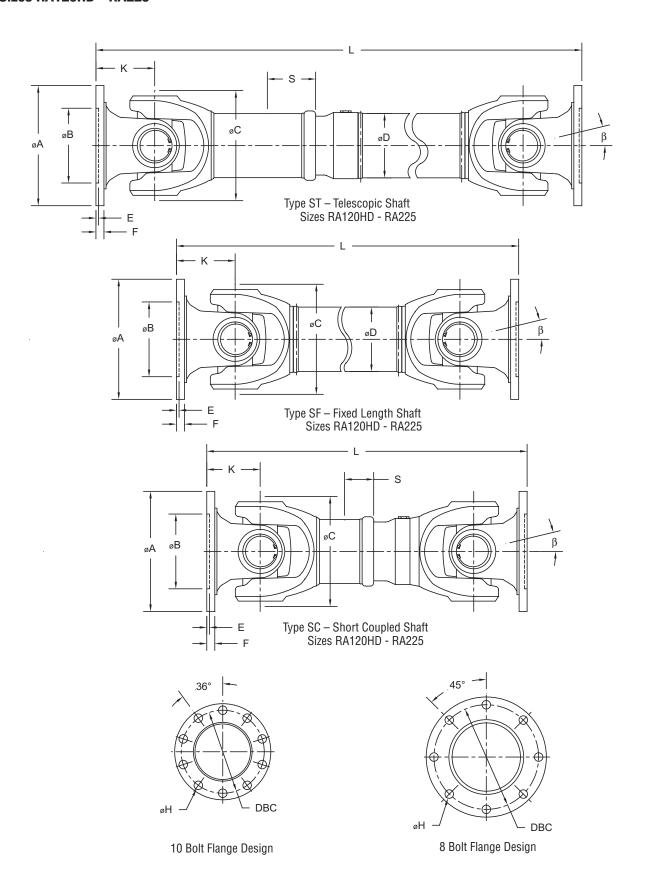
16.93/2.36

13.38/1.57

340/40

Special tube diameters available upon request
 Lis minimum for ST and SF designs
 Longer/shorter length compensation available upon request. Popular flange yoke configurations shown, special designs available upon request.

# Sizes RA120HD - RA225



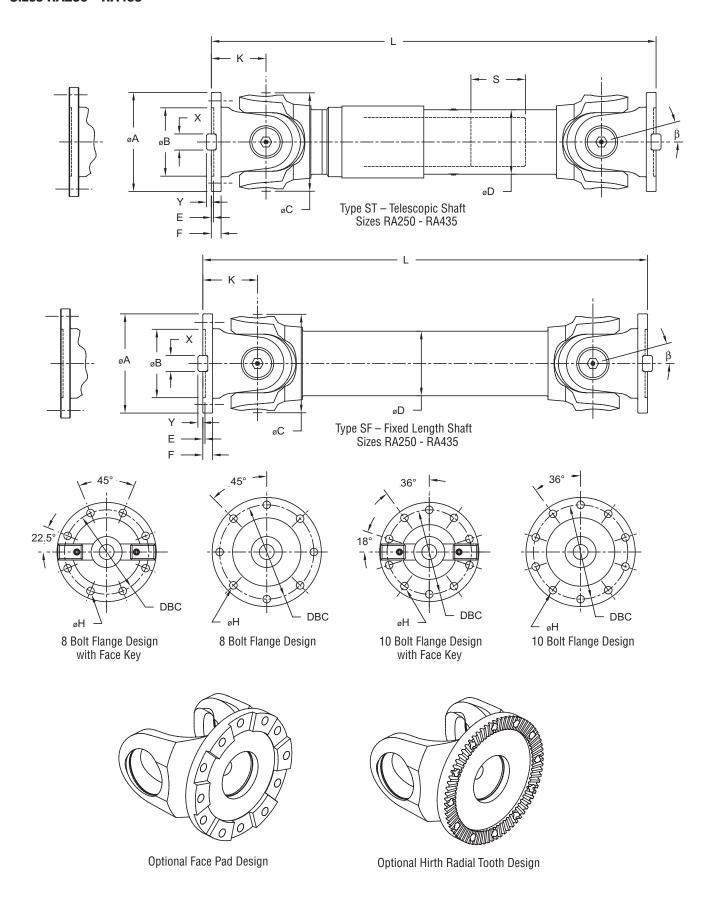
Size		RA	120HD			RA	150HD			RA	150	
Torque Ra	ntinas											
Torque riu		Lb.in.		Nm	1	b.in.		Nm		b.in.		Nm
T <sub>e</sub>		5,930		,800		2,125		,500		5,400		4,000
		22,302		2,520		0,975		,500		9,560		5,600
T <sub>ow</sub>										<u> </u>		
T <sub>L</sub>		22,037		2,490		0,842		,485		0,462		4,572
Tp		17,348		5,350	1	2,393	/	,050	92	1,253	1	0,650
Dimension		nches and m										
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
ß		10°		20°		20°		20°		20°		.0°
Α	4.72	120	5.91	150	5.91	150	7.09	180	5.91	150	7.09	180
В	2.95	75	3.54	90	3.54	90	4.33	110	3.54	90	4.33	110
С	4.92	125	4.92	125	5.43	138	5.43	138	5.91	150	5.91	150
D <sup>(1)</sup>	2.75	70	2.75	70	3.15	80	3.12	80	3.50	90	3.50	90
Е	0.10	2.5	0.12	3	0.12	3	0.14	3.6	0.12	3	0.14	3.6
F	0.35	9	0.35	9	0.39	10	0.39	10	0.47	12	0.47	12
K	2.36	60	2.36	60	2.56	65	2.56	65	2.95	75	2.95	75
DBC	4	101.5	5.12	130	5.12	130	6.12	155.5	5.12	130	6.12	155.5
Bolt Qty.	8	8	8	8	8	8	8	8	8	8	8	8
H	0.39	10	0.39	10	0.47	12	0.47	12	0.47	12	0.55	14
		/ Length Co	I		0.11	12	0.77	12	1 0.47	12	0.00	1-7
·····		nch		nm	in	nch	n	nm	ine	ch	n	nm
ST L/S		33/2.36		1/60		5/4.33		)/110	29.21			2/110
		2.09		307		3.58		345	17			55
SF L SC L/S		2.09 58/1.38		5/35		7/1.57		0/40	15.75			0/50
SC L/S		76/1.97		5/50		5/3.15		0/80	18.31			5/80
SC L/S		54/2.36		0/60	18.1	1/3.15	46	0/80	1			
									21.46/1.57 <sup>(3)</sup>		545/40	
SC L/S	17.7	72/2.36	45	0/60	-	_	-	_	23.03/3.15(3)		585/80 <sup>(3)</sup> 640/110 <sup>(3)</sup>	
SC L/S	17.7	72/2.36 —	45	0/60 —	-		-		23.03/			
SC L/S	17.7	_	45 1 <b>50HD</b>	0/60 —	-	 RA	180	_		/4.33 <sup>(3)</sup>		
SC L/S Size		_		0/60 —	-	RA	180	_		/4.33 <sup>(3)</sup>	640	
SC L/S	atings	— RA	150HD	_				Nm	25.20/	/4.33 <sup>(3)</sup>	640	/110 <sup>(3)</sup>
SC L/S Size Torque Ra	atings	RA	150HD			b.in.		Nm	25.20/	/4.33 <sup>(3)</sup> RA	640 <i>i</i>	/110 <sup>(3)</sup>
SC L/S  Size  Torque Ra	atings		150HD	Nm -,500	64	.b.in. 4,605	7	,300	25.20 <i>i</i>	/4.33 <sup>(3)</sup> RA b.in. 0,005	640/	/110 <sup>(3)</sup> Nm 1,300
SC L/S  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub>	atings	RA Lb.in. 39,825 55,755	150HD 4	Nm -,500 5,300	64 90	b.in. 4,605 0,447	7	,300 0,220	25.20 <i>i</i>	(4.33 <sup>(3)</sup> RA  b.in. 0,005 0,007	640 <i>/</i>	Nm 1,300 5,820
SC L/S  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub>	atings	RA Lb.in. 89,825 55,755 51,596	150HD 4	Nm -,500 5,300 5,830	64 90 71	.b.in. 4,605 0,447 1,614	7 10	7,300 0,220 5,092	25.20, L 10 14 12	(4.33 <sup>(3)</sup> B.in. 0,005 0,007 4,100	640,	Nm 1,300 5,820 4,023
SC L/S  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub>	3 8 8 8 1 1	Lb.in. 89,825 55,755 51,596 15,050	150HD 4 6 5	Nm -,500 5,300 5,830 3,000	64 90 7- 19	b.in. 4,605 0,447	7 10	,300 0,220	25.20, L 10 14 12	(4.33 <sup>(3)</sup> RA  b.in. 0,005 0,007	640,	Nm 1,300 5,820
SC L/S  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub>	atings	RA Lb.in. 89,825 55,755 61,596 15,050 nches and m	150HD  4 6 5 10 illimeters	Nm ,,500 5,300 6,830 3,000 except who	6 <sup>2</sup> 90 7 <sup>-</sup> 19 ere noted)	.b.in. 4,605 0,447 1,614 (3,815	7 10 8 2	,300 ),220 ,092 1,900	25.20, L 10 14 12 30	(4.33 <sup>(3)</sup> b.in. 0,005 0,007 4,100 9,750	640, 2225	Nm 1,300 5,820 4,023 85,000
SC L/S  Size  Torque Ra $T_e$ $T_{ow}$ $T_L$ $T_p$ Dimension	atings  5 5 5 1 nal Data (ir	Lb.in. 39,825 55,755 61,596 115,050 nches and m	150HD  4  6  5  10  illimeters inch	Nm -,500 5,300 5,830 3,000 <b>except who</b>	64 90 7- 19 ere noted)	b.in. 4,605 ),447 1,614 (3,815	7 10 8 2	,300 D,220 J,092 1,900	25.20, L 10 14 12 30	RA b.in. 0,005 0,007 4,100 9,750	640, 2225	Nm 1,300 5,820 4,023 85,000
SC L/S  Size  Torque Ra $T_e$ $T_{ow}$ $T_L$ $T_p$ Dimension	atings  5 5 1 nal Data (in inch	RA Lb.in. 89,825 61,596 115,050 nches and m mm	150HD  4 6 5 13 illimeters inch	Nm ,500 5,300 5,830 3,000 except who	90 7- 19 ere noted) inch	b.in. 4,605 0,447 1,614 3,815 mm	7 10 8 2-	,300 0,220 ,092 1,900 mm	25.20, L 10 14 12 30 inch	(4.33 <sup>(3)</sup> B.in. 0,005 0,007 4,100 9,750  mm 30°	640, 225	Nm 1,300 5,820 4,023 35,000 mm
SC L/S  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension  ß  A	stings  5 5 6 1 nal Data (ir	RA Lb.in. 89,825 61,596 15,050 nches and m mm 60° 165	150HD  4 6 5 10 illimeters inch 3 7.09	Nm ,500 5,300 5,830 3,000 <b>except who</b> mm 30°	64 90 7- 19 ere noted) inch	b.in. 4,605 0,447 1,614 3,815 mm 30°	77 10 8 2 · · · · · · · · · · · · · · · · · ·	,300 0,220 ,092 1,900 mm 30°	25.20, 10 14 12 30 inch	(4.33 <sup>(3)</sup> B.in. 0,005 0,007 4,100 9,750  mm 30° 225	640, 225	Nm 1,300 5,820 4,023 35,000 mm 5° 250
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension  ß  A  B	stings  3 5 5 1 nal Data (ir inch 3 6.50 3.74	RA Lb.in. 89,825 85,755 81,596 15,050 nches and m mm 80° 165 95	150HD  4  6  5  13  illimeters inch 3  7.09  4.33	Nm 5,500 5,300 5,830 3,000 <b>except who</b> mm 30° 180 110	90 77 19 ere noted) inch 3 7.09 4.33	.b.in. 4,605 0,447 1,614 13,815 mm 80° 180	77 10 8 8 2 · inch 8 8.86 5.51	,300 0,220 ,092 1,900 mm 30° 225 140	25.20,  L 10 14 12 30 inch 8.86 5.51	b.in. 0,005 0,007 4,100 9,750 mm 30° 225 140	640, 11 11 13 inch 2 9.84 5.51	Nm 1,300 5,820 4,023 35,000 mm 5° 250 140
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension  ß  A  B  C	stings  3 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	RA Lb.in. 89,825 55,755 51,596 15,050 nches and m mm 60° 165 95 158	150HD  4 66 55 10 illimeters inch 7.09 4.33 6.22	Nm 5,500 5,300 5,830 3,000 except who mm 80° 180 110	64 90 77 19 ere noted) inch 3 7.09 4.33 7	.b.in. 4,605 0,447 1,614 13,815 mm 80° 180 110	7 10 8 2 inch 8 8.86 5.51 7	,300 0,220 ,092 1,900 mm 30° 225 140 178	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03	b.in. 0,005 0,007 4,100 9,750 mm 30° 225 140 204	640, 1 1 1 3 3 inch 2 9.84 5.51 8.03	Nm 1,300 5,820 4,023 85,000 mm 5° 250 140 204
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension   ß  A  B  C  D <sup>(1)</sup>	stings  3 5 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	RA Lb.in. 89,825 55,755 51,596 15,050 nches and m mm 90° 165 95 158 100	150HD  4  6  5  13  illimeters inch 3  7.09  4.33	Nm 5,500 5,300 5,830 3,000 except who mm 80° 180 110 158	64 90 77 19 ere noted) inch 3 7.09 4.33 7 4.38	.b.in. 4,605 0,447 1,614 13,815 mm 80° 180	7 10 8 22 inch 3 8.86 5.51 7 4.38	,300 0,220 ,092 1,900 mm 30° 225 140	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50	b.in. 0,005 0,007 4,100 9,750 mm 30° 225 140	640, 11 11 13 3 inch 2 9.84 5.51 8.03 5.50	Nm 1,300 5,820 4,023 35,000 mm 5° 250 140
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension	stings  3 5 5 1 1 nal Data (ir inch 3 6.50 3.74 6.22 4 0.12	RA Lb.in. 89,825 55,755 51,596 15,050 nches and m mm '00° 165 95 158 100 3.0	150HD  4 66 55 10 illimeters inch 7.09 4.33 6.22	Nm 5,500 5,300 5,830 3,000 except who mm 80° 180 110 158 100 3.6	64 90 77 19 ere noted) inch 3 7.09 4.33 7 4.38 0.14	.b.in. 4,605 0,447 1,614 13,815 mm 80° 180 110	7 10 8 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	,300 0,220 1,900 mm 30° 225 140 178 110 5	25.20,  10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20	b.in. 0,005 0,007 4,100 9,750 mm 30° 225 140 204	640, 1 1 1 1 3 3 inch 2 9.84 5.51 8.03 5.50 0.24	Nm 1,300 5,820 4,023 85,000 mm 5° 250 140 204 140 6
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension	stings  3 5 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	RA Lb.in. 89,825 55,755 51,596 15,050 nches and m mm 90° 165 95 158 100	150HD  4 66 55 18 iillimeters inch 3 7.09 4.33 6.22 4	Nm 5,500 5,300 5,830 3,000 except who mm 80° 180 110 158	64 90 77 19 ere noted) inch 3 7.09 4.33 7 4.38	.b.in. 4,605 0,447 1,614 13,815 mm 30° 180 110 178	7 10 8 22 inch 3 8.86 5.51 7 4.38	,300 0,220 1,992 1,900 mm 30° 225 140 178 110	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50	b.in. 0,005 0,007 4,100 9,750 mm 30° 225 140 204 140	640, 11 11 13 3 inch 2 9.84 5.51 8.03 5.50	Nm 1,300 5,820 4,023 85,000 mm 5° 250 140 204 140
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension	stings  3 5 5 1 1 nal Data (ir inch 3 6.50 3.74 6.22 4 0.12	RA Lb.in. 89,825 55,755 51,596 15,050 nches and m mm '00° 165 95 158 100 3.0	150HD  4 6 5 13 iillimeters inch 3 7.09 4.33 6.22 4 0.14	Nm 5,500 5,300 5,830 3,000 except who mm 80° 180 110 158 100 3.6	64 90 77 19 ere noted) inch 3 7.09 4.33 7 4.38 0.14	b.in. 4,605 0,447 1,614 13,815  mm 30° 180 110 178 110 3.6	7 10 8 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	,300 0,220 1,900 mm 30° 225 140 178 110 5	25.20,  10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20	b.in. 0,005 0,007 4,100 9,750 mm 30° 225 140 204 140 5	640, 1 1 1 1 3 3 inch 2 9.84 5.51 8.03 5.50 0.24	Nm 1,300 5,820 4,023 85,000 mm 5° 250 140 204 140 6
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension	tings  3 5 5 1 1 nal Data (ir inch 3 6.50 3.74 6.22 4 0.12 0.47	RA Lb.in. 89,825 55,755 51,596 15,050 nches and m mm .0° 165 95 158 100 3.0 12	150HD  4 6 5 13 iillimeters inch 3 7.09 4.33 6.22 4 0.14 0.47	Nm 5,500 6,300 6,830 3,000 <b>except who</b> mm 80° 180 110 158 100 3.6 12	64 90 77 19 ere noted) inch 3 7.09 4.33 7 4.38 0.14 0.55	b.in. 4,605 0,447 1,614 13,815  mm 30° 180 110 178 110 3.6 14	7 10 8 22 inch 3 8.86 5.51 7 4.38 0.20 0.59	,300 0,220 1,992 1,900 mm 30° 225 140 178 110 5	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20 0.59	b.in. 0,005 0,007 4,100 9,750  mm 30° 225 140 204 140 5 15	640, 225 1 1 1 1 3 inch 2 9.84 5.51 8.03 5.50 0.24 0.71	Nm 1,300 5,820 4,023 55,000 mm 5° 250 140 204 140 6 18
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension   ß  A  B  C  D(1)  E  F  K  DBC	tings  3	RA Lb.in. 89,825 65,755 61,596 15,050 nches and m mm .0° 165 95 158 100 3.0 12 86	150HD  4 6 5 13 iillimeters inch 3 7.09 4.33 6.22 4 0.14 0.47 3.39	Nm 5,500 6,300 6,830 3,000 <b>except who</b> 180 110 158 100 3.6 12 86	64 90 77 19 ere noted) inch 3 7.09 4.33 7 4.38 0.14 0.55 3.78	b.in. 4,605 0,447 1,614 3,815  mm 30° 180 110 178 110 3.6 14 96	inch  8.86 5.51 7 4.38 0.20 0.59 3.78	,300 0,220 1,900 mm 30° 225 140 178 110 5 15	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20 0.59 4.33	MA (4.33 <sup>(3)</sup> B.in.  0,005  0,007  4,100  9,750  mm  30°  225  140  204  140  5  15  110	640, 225 1 1 1 1 3 3 inch 2 9.84 5.51 8.03 5.50 0.24 0.71 4.33	Nm 1,300 5,820 4,023 55,000 mm 5° 250 140 204 140 6 18
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension   ß  A  B  C  D(1)  E  F  K	stings  3	RA Lb.in. 89,825 65,755 61,596 15,050 166s and m 10° 165 95 158 100 3.0 12 86 140	150HD  4 6 5 13 iillimeters inch 3 7.09 4.33 6.22 4 0.14 0.47 3.39 6.12	Nm 5,500 6,300 6,830 3,000 <b>except who</b> 180 110 158 100 3.6 12 86 155.5	90 7-19 ere noted) inch 3 7.09 4.33 7 4.38 0.14 0.55 3.78 6.12	b.in. 4,605 0,447 1,614 13,815  mm 80° 180 110 178 110 3.6 14 96 155.5	inch  8.86  5.51  7  4.38  0.20  0.59  3.78  7.72	,300 ,0,220 ,0,92 1,900 mm 30° 225 140 178 110 5 15 96 196	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20 0.59 4.33 7.72	Max (4.33) (5) (4.33) (7) (4.33) (7) (7) (7) (7) (7) (7) (7) (7) (7) (7	640, 225 1 1 1 1 3 inch 2 9.84 5.51 8.03 5.50 0.24 0.71 4.33 8.58	Nm 1,300 5,820 4,023 35,000 mm 5° 250 140 204 140 6 18 110 218
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension	stings  3	RA Lb.in. 89,825 65,755 61,596 15,050 165 95 158 100 3.0 12 86 140 8 16	150HD  4 6 5 13 illimeters inch 3 7.09 4.33 6.22 4 0.14 0.47 3.39 6.12 8 0.63	Nm 5,500 6,300 6,830 3,000 <b>except who</b> mm 30° 180 110 158 100 3.6 12 86 155.5 8 16	90 72 19 ere noted) inch 3 7.09 4.33 7 4.38 0.14 0.55 3.78 6.12	b.in. 4,605 0,447 1,614 13,815  mm 30° 180 110 178 110 3.6 14 96 155.5	inch  8.86 5.51 7 4.38 0.20 0.59 3.78 7.72 8	,300 D,220 J,992 1,900 mm 30° 225 140 178 110 5 15 96 196 8	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20 0.59 4.33 7.72 8	Mathematical Property of the Control	640, 225 1 1 1 1 3 inch 2 9.84 5.51 8.03 5.50 0.24 0.71 4.33 8.58 8	Nm 1,300 5,820 4,023 85,000 mm 5° 250 140 204 140 6 18 110 218
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension	stings  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	RA Lb.in. 89,825 61,596 15,050 nches and m mm 60° 165 95 158 100 3.0 12 86 140 8 16 / Length Co	150HD  4 6 5 13 illimeters inch 3 7.09 4.33 6.22 4 0.14 0.47 3.39 6.12 8 0.63 mpensation	Nm -,500 -,300 -,830 -,830 -,3,000	64 90 77 19 ere noted) inch 3 7.09 4.33 7 4.38 0.14 0.55 3.78 6.12 10 0.63	b.in. 4,605 0,447 1,614 3,815  mm 80° 180 110 178 110 3.6 14 96 155.5 10	inch  8.86  5.51  7  4.38  0.20  0.59  3.78  7.72  8  0.63	,300 D,220 J,092 1,900 mm 30° 225 140 178 110 5 15 96 196 8	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20 0.59 4.33 7.72 8 0.63	Manual Ma	640, 1 1 1 1 1 3 3 inch 2 9.84 5.51 8.03 5.50 0.24 0.71 4.33 8.58 8 0.71	Nm 1,300 5,820 4,023 35,000 mm 5° 250 140 204 140 6 18 110 218 8
SC L/S  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension	stings  3	RA Lb.in. 89,825 65,755 61,596 15,050 165 95 158 100 3.0 12 86 140 8 16 / Length Conch	150HD  4 6 5 13 illimeters inch 3 7.09 4.33 6.22 4 0.14 0.47 3.39 6.12 8 0.63 mpensation	Nm -,500 5,300 5,830 3,000 except who mm 30° 180 110 158 100 3.6 12 86 155.5 8 16 on S	64 90 77 19 ere noted) inch 3 7.09 4.33 7 4.38 0.14 0.55 3.78 6.12 10 0.63	b.in. 4,605 0,447 1,614 3,815  mm 80° 180 110 178 110 3.6 14 96 155.5 10 16	inch  8.86 5.51 7 4.38 0.20 0.59 3.78 7.72 8 0.63	,300 D,220 J,992 1,900 mm 30° 225 140 178 110 5 15 96 196 8 16	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20 0.59 4.33 7.72 8 0.63	Manual Ma	640, 1 1 1 1 3 3 inch 2 9.84 5.51 8.03 5.50 0.24 0.71 4.33 8.58 8 0.71	Nm 1,300 5,820 4,023 35,000 mm 5° 250 140 204 140 6 18 110 218 8
SC L/S  Size  Torque Ra  Torque Ra  Tow  TL  Tp  Dimension    B  C  D(1)  E  F  K  DBC  Bolt Qty.  H  Minimum  ST L/S	stings  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	RA Lb.in. 89,825 65,755 61,596 15,050 nches and m mm .0° 165 95 158 100 3.0 12 86 140 8 16 / Length Co	150HD  4 6 5 13 iillimeters inch 3 7.09 4.33 6.22 4 0.14 0.47 3.39 6.12 8 0.63 mpensatio	Nm 4,500 5,300 5,830 3,000 except who mm 30° 180 110 158 100 3.6 12 86 155.5 8 16 on S nm	90 7-19 ere noted) inch 37.09 4.33 7 4.38 0.14 0.55 3.78 6.12 10 0.63	b.in. 4,605 0,447 1,614 13,815  mm 80° 180 110 178 110 3.6 14 96 155.5 10 16  nch 3/4.33	inch  8.86 5.51 7 4.38 0.20 0.59 3.78 7.72 8 0.63	,300 ,0,220 ,0,92 1,900 mm 30° 225 140 178 110 5 15 96 196 8 16	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20 0.59 4.33 7.72 8 0.63 inch 32.68	Market Ma	640, 1 1 1 1 1 3 3 inch 2 9.84 5.51 8.03 5.50 0.24 0.71 4.33 8.58 8 0.71	Nm 1,300 5,820 4,023 35,000 mm 5° 250 140 204 140 6 18 110 218 8 18
SC L/S  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension   ß  A  B  C  D(1)  E  F  K  DBC  Bolt Qty.  H  Minimum  ST L/S  SF L	stings  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	RA Lb.in. 89,825 65,755 61,596 15,050 nches and m mm .0° 165 95 158 100 3.0 12 86 140 8 16 / Length Co	150HD  4 6 5 13 illimeters inch 3 7.09 4.33 6.22 4 0.14 0.47 3.39 6.12 8 0.63 mpensatio	Nm 4,500 5,300 5,830 3,000 except whe mm 30° 180 110 158 100 3.6 12 86 155.5 8 16 on S nm 0/110 130	64 90 77 19 ere noted) inch 3 7.09 4.33 7 4.38 0.14 0.55 3.78 6.12 10 0.63	b.in. 4,605 0,447 1,614 3,815  mm 80° 180 110 178 110 3.6 14 96 155.5 10 16  nch 3/4.33 3.31	inch  8.86 5.51 7 4.38 0.20 0.59 3.78 7.72 8 0.63	,300 ,0,220 ,0,092 1,900 mm 30° 225 140 178 110 5 15 96 196 8 16	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20 0.59 4.33 7.72 8 0.63 in: 32.68	Manual Ma	640, 1 1 1 1 1 3 3 inch 2 9.84 5.51 8.03 5.50 0.24 0.71 4.33 8.58 8 0.71	Nm 1,300 5,820 4,023 35,000 mm 5° 250 140 204 140 6 18 110 218 8 18
SC L/S  Size  Torque Ra  Torque Ra  Tow  TL  Tp  Dimension	stings  3 5 5 1 nal Data (ir inch 3 6.50 3.74 6.22 4 0.12 0.47 3.39 5.51 8 0.63 Length L <sup>(2)</sup> 25.6 1 15.7	RA Lb.in. 89,825 55,755 51,596 15,050 nches and m mm 60° 165 95 158 100 3.0 12 86 140 8 16 / Length Conch 98/4.33 6.93 5/1.77(3)	150HD  4 6 5 13 illimeters inch 3 7.09 4.33 6.22 4 0.14 0.47 3.39 6.12 8 0.63 mpensatio	Nm 4,500 5,300 5,830 3,000 except whe mm 30° 180 110 158 100 3.6 12 86 155.5 8 16 on S nm 0/110 130 0/45 <sup>(3)</sup>	64 90 77 19 ere noted) inch 3 7.09 4.33 7 4.38 0.14 0.55 3.78 6.12 10 0.63	b.in. 4,605 0,447 1,614 13,815  mm 80° 180 110 178 110 3.6 14 96 155.5 10 16  nch 3/4.33 3.31 0/1.77(9)	inch  8.86 5.51 7 4.38 0.20 0.59 3.78 7.72 8 0.63	,300 ,0,220 ,0,092 1,900 mm 30° 225 140 178 110 5 15 96 196 8 16	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20 0.59 4.33 7.72 8 0.63 inch 32.68 20 21.65,	MAC (4.33 <sup>(3)</sup> B.in.  0,005  0,007  4,100  9,750  mm  30°  225  140  204  140  5  15  110  196  8  16  ch  6/5.52  .47  /1.57 <sup>(3)</sup>	640, 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Nm 1,300 5,820 4,023 35,000 mm 55° 250 140 204 140 6 18 110 218 8 18
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension    B  C  D(1)  E  F  K  DBC  Bolt Qty.  H  Minimum  ST L/S  SF L  SC L/S  SC L/S	stings  3 5 5 1 nal Data (ir inch 3 6.50 3.74 6.22 4 0.12 0.47 3.39 5.51 8 0.63 Length L <sup>(2)</sup> 25.9 1 15.7 17.3	RA Lb.in. 89,825 55,755 51,596 15,050 nches and m mm 60° 165 95 158 100 3.0 12 86 140 8 16 / Length Conch 188/4.33 6.93 5/1.77 <sup>(3)</sup> 2/3.15 <sup>(3)</sup>	150HD  4 66 55 10 illimeters inch 3 7.09 4.33 6.22 4 0.14 0.47 3.39 6.12 8 0.63 mpensation 660 4 400 440	Nm 4,500 5,300 5,830 3,000 except when mm 80° 180 110 158 100 3.6 12 86 155.5 8 16 on S nm 0/110 130 0/45 <sup>(3)</sup> 0/80 <sup>(3)</sup>	64 90 77 19 ere noted) inch 3 7.09 4.33 7 4.38 0.14 0.55 3.78 6.12 10 0.63 ir 18.50 19.68	mm 30° 180 110 3.6 14 96 155.5 10 16 mch 3/4.33 3.31 0/1.77° 0/2.36° 18.6 10.5 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7	inch  8.86 5.51 7 4.38 0.20 0.59 3.78 7.72 8 0.63	,300 ,0,220 ,0,092 1,900 mm 30° 225 140 178 110 5 15 96 196 8 16 mm 0/110 .65 .0/45 <sup>(3)</sup>	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20 0.59 4.33 7.72 8 0.63 inch 32.68 20 21.65, 23.62,	MAC (4.33 <sup>(3)</sup> B.in.  0,005  0,007  4,100  9,750  mm  30°  225  140  204  140  5  15  110  196  8  16  ch  3/5.52  .47  /1.57 <sup>(3)</sup> /2.17 <sup>(3)</sup>	640, 1225 1 1 1 1 3 3 inch 2 9.84 5.51 8.03 5.50 0.24 0.71 4.33 8.58 8 0.71 nn 830 550 600 600 600 600 600 600 600 600 60	Nm 1,300 5,820 4,023 35,000 mm 55° 250 140 204 140 6 18 110 218 8 18
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension    B  C  D(1)  E  F  K  DBC  Bolt Qty.  H  Minimum  ST L/S  SF L  SC L/S  SC L/S  SC L/S	stings  3 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	RA Lb.in. 89,825 55,755 51,596 15,050 nches and m mm 60° 165 95 158 100 3.0 12 86 140 8 16 / Length Conch nch 98/4.33 6.93 5/1.77(3) 2/3.15(3)	150HD  4 66 55 18 illimeters inch 3 7.09 4.33 6.22 4 0.14 0.47 3.39 6.12 8 0.63 pmpensation 660 440 400 440 499	Nm 4,500 5,300 5,830 3,000 except when mm 80° 180 110 158 100 3.6 12 86 155.5 8 16 DD S nm 0/110 130 0/45 <sup>(3)</sup> 0/80 <sup>(3)</sup> 5/45	64 90 77 19 ere noted) inch 3 7.09 4.33 7 4.38 0.14 0.55 3.78 6.12 10 0.63 ir 29.13 18 18.50 19.68 22.08	b.in. 4,605 0,447 1,614 3,815  mm 30° 180 110 178 110 3.6 14 96 155.5 10 16  nch 3/4.33 3.31 0/1.77° 9/2.36° 5/1.77	inch  8.86 5.51 7 4.38 0.20 0.59 3.78 7.72 8 0.63	,300 ,0,220 ,0,092 1,900 mm 30° 225 140 178 110 5 15 96 196 8 16 nm 0/110 65 0/45 <sup>(3)</sup> 0/60 <sup>(3)</sup> 0/45	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20 0.59 4.33 7.72 8 0.63 inch 32.68 20 21.65, 23.62, 25.56	b.in. 0,005 0,007 4,100 9,750  mm 30° 225 140 204 140 5 15 110 196 8 16 ch 3/5.52 .47 /1.57 <sup>(3)</sup> /2.17 <sup>(3)</sup> 5/4.33	640, 225  1 1 1 1 3 inch 2 9.84 5.51 8.03 5.50 0.24 0.71 4.33 8.58 8 0.71  nn 830 5 550 600 650	Nm 1,300 5,820 4,023 35,000 mm 55° 250 140 204 140 6 18 110 218 8 18 18 0/140 520 0/40(3) 0/55(3)
SC L/S  Size  Torque Ra  Tow  TL  Tp  Dimension    B  C  D(1)  E  F  K  DBC  Bolt Qty.  H  Minimum  ST L/S  SF L  SC L/S  SC L/S	tings  3 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	RA Lb.in. 89,825 55,755 51,596 15,050 nches and m mm 60° 165 95 158 100 3.0 12 86 140 8 16 / Length Conch 188/4.33 6.93 5/1.77 <sup>(3)</sup> 2/3.15 <sup>(3)</sup>	150HD  4 66 55 13 illimeters inch 3 7.09 4.33 6.22 4 0.14 0.47 3.39 6.12 8 0.63 pmpensation 666 44 400 440 49 555	Nm 4,500 5,300 5,830 3,000 except when mm 80° 180 110 158 100 3.6 12 86 155.5 8 16 on S nm 0/110 130 0/45 <sup>(3)</sup> 0/80 <sup>(3)</sup>	64 90 77 199 ere noted) inch 3 7.09 4.33 7 4.38 0.14 0.55 3.78 6.12 10 0.63 ir 29.13 18 18.50 19.69 22.00 23.66	mm 30° 180 110 3.6 14 96 155.5 10 16 mch 3/4.33 3.31 0/1.77° 0/2.36° 18.6 10.5 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7	inch  8.86 5.51 7 4.38 0.20 0.59 3.78 7.72 8 0.63  nn 740 470 500 566 600	,300 ,0,220 ,0,092 1,900 mm 30° 225 140 178 110 5 15 96 196 8 16 mm 0/110 .65 .0/45 <sup>(3)</sup>	25.20,  L 10 14 12 30 inch 8.86 5.51 8.03 5.50 0.20 0.59 4.33 7.72 8 0.63 inch 32.68 20 21.65, 23.62, 25.56	MAC (4.33 <sup>(3)</sup> B.in.  0,005  0,007  4,100  9,750  mm  30°  225  140  204  140  5  15  110  196  8  16  ch  3/5.52  .47  /1.57 <sup>(3)</sup> /2.17 <sup>(3)</sup>	640, 225  1 1 1 1 3 inch 2 9.84 5.51 8.03 5.50 0.24 0.71 4.33 8.58 8 0.71  nn 830 5 550 600 650	Nm 1,300 5,820 4,023 35,000 mm 55° 250 140 204 140 6 18 110 218 8 18



SC L/S 23.62/4.33 600/110 25.59/4.33

(1) Special tube diameters available upon request
(2) L is minimum for ST and SF designs
(3) Special yokes required, please consult factory
Longer/shorter length compensation available upon request. Popular flange yoke configurations shown, special designs available upon request.

# **Sizes RA250 - RA435**



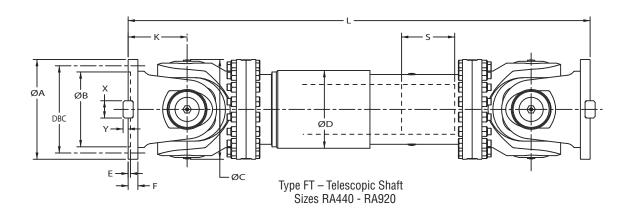


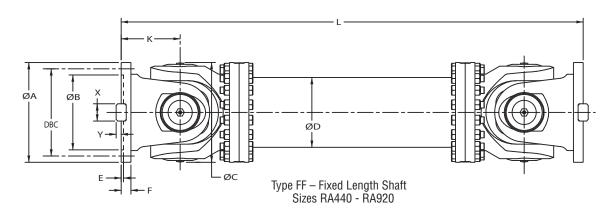
Size		RA	250			RA	285			RA	315		
Torque Ra	atings												
		Lb.in.		KNm		b.in.	P	(Nm		b.in.		KNm	
T <sub>e</sub>		33,800		26.4		5,400		30.0		4,200		46.8	
T <sub>ow</sub>		50,700		39.6		8,000		45.0		1.300		70.2	
		70,800		19.3		8,100		28.0		,		41.2	
T <sub>L</sub>										4,400			
Tp		64,800		52.5		8,000	(	80.8	86	2,000		97.4	
Dimensio		ches and m	1										
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	
ß		5°		15°		5°		15°		15°	15		
A	8.86	225.0	9.84	250.0	9.84	250.0	11.22	285.0	11.22	285.0	12.40	315.	
В	4.13	105.0	5.51	140.0	4.13	105.0	6.89	175.0	4.92	125.0	6.89	175.	
С	8.86	225.0	8.86	225.0	9.84	250.0	9.84	250.0	11.22	285.0	11.22	285.	
D <sup>(1)</sup>	6	152.0	6	152.0	6.50	165.0	6.50	165.0	7.50	191.0	7.50	191.	
E	0.20	5.0	0.24	6.0	0.24	6.0	0.28	7.0	0.28	7.0	0.28	7.	
F	0.63	16.0	0.71	18.0	0.98	25.0	0.79	20.0	1.06	27.0	0.87	22.	
K	4.92	125.0	4.92	125.0	5.51	140.0	5.51	140.0	6.30	160.0	6.30	160.	
DBC	7.72	196.0	8.58	218.0	8.58	218.0	9.65	245.0	9.65	245.0	11.02	280.	
	8	8	8	8	8	8	8	8	8	8	8	8	
Bolt Qty.	0.63	16.0		18		19.0	0.79	20.0		21.0		22.	
			0.71		0.75		0.79	20.0	0.83		0.87	22.	
X	1.26	32.0	-	_	1.57	40.0	-		1.57	40.0	-		
Υ	0.35	9.0	_	-	0.49	13.0	_	-	0.59	15.0	_	_	
Minimum	Length L(2)	/ Length Co	mpensati	on S									
	i	nch	r	nm	ir	nch	n	nm	in	ch	n	nm	
ST L	30	6.42	9:	25.0	36	3.81	93	35.0	46	.85	119	90.0	
S	5	5.51	14	40.0	5	.51	14	10.0	5.	51	14	10.0	
	2:	2.44	5	70.0	24	1.61	62	25.0	28	.35	72	20.0	
SF L				00.0	46	6.06	11	70.0	47	64	12	10.0	
		3.31	1 11	()().()						47.64 1210.0			
FT L	4:	3.31											
FT L S	4:	5.51	14	40.0	5	.51	14	10.0	5.	51	14	10.0	
FT L	4:		14		5		14		5.		14	10.0 10.0	
FT L S	4:	5.51 9.69	14	40.0	5	.51 2.05	14	10.0	5.	51 .20	14		
FT L S FF L	4: 5 1!	5.51 9.69	1 <sub>4</sub>	40.0	5	.51 2.05	14 56	10.0	5.	51 .20	14 64		
FT L S FF L	4: 5 1! atings	5.51 9.69 <b>RA</b>	50 350	40.0 00.0	5 22	.51 2.05 RA	56 390	40.0 60.0	5. 25	51 .20	14 64 <b>435</b>	10.0	
FT L S FF L Size Torque Ra	4: 5 1! atings	5.51 9.69 RA Lb.in.	50 350	40.0 00.0 KNm	5 22	.51 2.05 <b>RA</b> .b.in.	14 56 <b>390</b>	10.0 50.0 KNm	5. 25	51 .20 <b>RA</b> .b.in.	14 64 <b>435</b>	10.0 KNm	
FT L S FF L Size Torque Ra	4; 5 1! atings	5.51 9.69 <b>RA</b> Lb.in. 61,600	350	40.0 00.0 KNm 74.8	5 22 L 97	.51 2.05 RA .b.in. 9,500	390 k	40.0 60.0 KNm 10.7	5. 25 L 1,4	51 .20 <b>RA</b> b.in.	14 64 <b>435</b>	KNm 158.2	
FT L S FF L Size Torque Ra T <sub>e</sub> T <sub>ow</sub>	44 5 19 <b>atings</b>	6.51 9.69 RA Lb.in. 61,600 92,300	350	40.0 00.0 KNm 74.8	5 22 L 97 1,4	.51 2.05 RA .b.in. 9,500 69,000	12 56 390	40.0 60.0 KNm 10.7 66.0	5. 25 L 1,4 2,1	51 .20 RA .b.in. .00,000 .00,000	14 64 435	KNm 158.2 237.3	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub>	44 5 11 <b>atings</b> 66 99 50	6.51 9.69 RA Lb.in. 61,600 92,300 07,400	350	KNm 74.8 112.1 57.3	L 97 1,44	.51 2.05 RA .b.in. 9,500 69,000 3,800	390 k	KNm 10.7 66.0 32.9	5. 25 L 1,4 2,1	51 .20 RA .b.in. .00,000 .00,000 .9,500	14 64 435	KNm 158.2 237.3 111.8	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub>	44 5 119 atings 66 99 56	RA  Lb.in. 61,600 92,300 07,400 848,000	350	KNm 74.8 112.1 57.3 152.3	L 97 1,44 73 2,0	.51 2.05 RA .b.in. 9,500 69,000	390 k	40.0 60.0 KNm 10.7 66.0	5. 25 L 1,4 2,1	51 .20 RA .b.in. .00,000 .00,000	14 64 435	KNm 158.2 237.3	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub>	44 5 119 atings 66 99 56	6.51 9.69 RA Lb.in. 61,600 92,300 07,400	350	KNm 74.8 112.1 57.3 152.3	L 97 1,44 73 2,0	.51 2.05 RA .b.in. 9,500 69,000 3,800	390 k	KNm 10.7 66.0 32.9	5. 25 L 1,4 2,1	51 .20 RA .b.in. .00,000 .00,000 .9,500	14 64 435	KNm 158.2 237.3	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension	44 5 119 atings 66 99 56	RA  Lb.in. 61,600 92,300 07,400 848,000	350	KNm 74.8 112.1 57.3 152.3	L 97 1,44 73 2,0	.51 2.05 RA .b.in. 9,500 69,000 3,800	390 k	KNm 10.7 66.0 32.9	5. 25 L 1,4 2,1	51 .20 RA .b.in. .00,000 .00,000 .9,500	14 64 435	KNm 158.2 237.3 111.8 310.7	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension	44 5 19 atings 66 98 56 1,3	RA Lb.in. 61,600 92,300 07,400 848,000 aches and m	350 350 illimeters inch	KNm 74.8 112.1 57.3 152.3 <b>except who</b>	5 22 L 97 1,4 73 2,0 ere noted)	.51 2.05 RA .b.in. 9,500 69,000 3,800 67,000	14 56 390	KNm 10.7 66.0 32.9	5. 25  L 1,4 2,1 98 2,7	51 .20  RA b.in. 00,000 00,000 9,500 50,000	14 64 435	KNm 158.2 237.3 111.8 310.7	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension	44 5 19 atings 66 98 56 1,3	RA Lb.in. 61,600 92,300 07,400 348,000 aches and m	350 350 illimeters inch	KNm 74.8 112.1 57.3 152.3 except whe	5 22 L 97 1,4 73 2,0 ere noted)	.51 2.05 RA .b.in. .9,500 .69,000 .3,800 .67,000	14 56 390	KNm 10.7 66.0 32.9 33.6	5. 25  L 1,4 2,1 98 2,7	51 .20  RA .b.in00,000 .00,000 .9,500 .50,000 .mm	14 64 435	KNm 158.2 237.3 111.8 310.7	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension	44 5 119 atings 66 99 56 1,3 nal Data (in inch 1	RA Lb.in. 61,600 92,300 07,400 848,000 nches and m mm 5° 315.0	350  Sillimeters inch	KNm 74.8 112.1 57.3 152.3 <b>except who</b> mm 15° 350.0	5 22 L 97 1,4 73 2,0 ere noted) inch	.51 2.05 RA .b.in. 9,500 69,000 3,800 67,000 mm 5° 350.0	14 56 390	KNm 10.7 66.0 32.9 33.6 mm 15° 390.0	5. 25  L 1,4 2,1 98 2,7	51 .20  RA b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0	14 64 435 inch	KNm 158.2 237.3 111.8 310.7 mn 5° 435	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension  ß A B	44 5 19 <b>atings</b> 66 99 56 1,5 <b>nal Data (ir</b> inch 1 12.40 5.12	8.51 9.69 RA Lb.in. 61,600 92,300 07,400 848,000 nches and m mm 5° 315.0 130.0	350 350 iillimeters inch	KNm 74.8 112.1 57.3 152.3 <b>except whe</b> mm 15° 350.0 220.0	5 22 L 97 1,44 73 2,00 inch 13.78 6.10	.51 2.05 RA b.in. 9,500 69,000 3,800 67,000 mm 5° 350.0 155.0	14 56 390   1   1   1   8   2   inch   15.35   9.84	KNm 10.7 66.0 32.9 33.6 mm	5. 25  L 1,4 2,1 98 2,7 inch 15.35 6.69	51 .20  RA  b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0	144 64 435  inch 17.13 11.02	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension  ß  A  B  C	44 5 19 <b>atings</b> 60 99 50 1,3 <b>nal Data (ir</b> inch 12.40 5.12 12.40	8.51 9.69 RA Lb.in. 61,600 92,300 07,400 848,000 nches and m mm 5° 315.0 130.0 315.0	350 350 iillimeters inch 13.78 8.66 12.40	KNm 74.8 112.1 57.3 152.3 <b>except whe</b> mm 15° 350.0 220.0 315.0	L 97 1,44 73 2,00 ere noted inch 13.78 6.10 13.78	.51 2.05 RA .b.in. 9,500 69,000 3,800 67,000 mm 5° 350.0 155.0 350.0	14 56 390   1   1   1   2   inch   15.35   9.84   13.78	KNm 10.7 66.0 32.9 33.6 mm 15° 390.0 250.0 350.0	5. 25  L 1,4 2,1 98 2,7 inch 15.35 6.69 15.35	51 .20  RA  b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0	inch 17.13 11.02 15.35	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 390	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D <sup>(1)</sup>	44 5 19 4 19 4 19 5 10 1,3 10 10 10 10 10 10 10 10 10 10 10 10 10	6.51 9.69 RA Lb.in. 61,600 92,300 07,400 848,000 nches and m mm 5° 315.0 130.0 315.0 222.0	350 350 iillimeters inch 13.78 8.66 12.40 8.75	KNm 74.8 112.1 57.3 152.3 <b>except whe</b> mm 15° 350.0 220.0 315.0 222.0	L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78	.51 2.05 RA .b.in. 9,500 69,000 3,800 67,000 mm .5° 350.0 155.0 350.0 254.0	14 56 390	MO.0 60.0 KNm 10.7 66.0 32.9 33.6 mm 15° 390.0 250.0 350.0 254.0	5. 25  L 1,4 2,1 98 2,7 inch 15.35 6.69 15.35 10.50	51 .20  RA  b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0	inch 1 17.13 11.02 15.35 10.50	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 390 267	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D(1) E	44: 55 119  atings 60 99 50 1,3  nal Data (ir inch 12.40 5.12 12.40 8.75 0.31	8.51 9.69 RA Lb.in. 61,600 92,300 07,400 848,000 nches and m mm 5° 315.0 130.0 315.0 222.0	350 350 iillimeters inch 13.78 8.66 12.40 8.75 0.31	KNm 74.8 112.1 57.3 152.3 <b>except whe</b> mm 15° 350.0 220.0 315.0 222.0 8	L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31	.51 2.05 RA 2.05 RA 2.05 RA 2.05 8 RA 2.00 8 RA 2.00 Ra 2.00 RA 2.00 RA 2.00 RA 2.00 RA 2.00 RA 2.00 RA 2.00 RA 2.00 Ra 2.00 Ra 2.00 Ra 2.00 Ra 2.00 Ra 2.00 Ra 2.00 Ra 2.00 Ra 2.00 C 2.00 Ra 2.00 Ra 2.00 Ra 2.00 Ra 2.00 Ra 2.00 Ra 2.00 Ra 2.00 Ra 2 C 2 C 2 C 2 C 2 C 2 C 2 C 2 C 2 C 2	14 56 390 1 1 1 8 2 inch 15.35 9.84 13.78 10 0.31	MO.0 MINION 10.7 66.0 32.9 33.6 MINION 15° 390.0 250.0 350.0 254.0 8	5. 25  L 1,4 2,1 98 2,7 inch 15.35 6.69 15.35 10.50 0.31	51 .20  RA .b.in00,000 .00,000 .9,500 .50,000  mm .15° .390.0 .170.0 .390.0 .267.0 .8	inch 17.13 11.02 15.35 10.50 0.39	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 390 267	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension  ß  A  B  C  D <sup>(1)</sup> E  F	44 5 19 44 66 99 50 1,3 <b>nal Data (ir</b> inch 12.40 5.12 12.40 8.75 0.31 1.26	5.51 9.69  RA  Lb.in. 61,600 92,300 07,400 848,000 nches and m mm 5° 315.0 130.0 315.0 222.0 8 32.0	350 350 350 iillimeters inch 13.78 8.66 12.40 8.75 0.31 0.98	KNm 74.8 112.1 57.3 152.3 <b>except whe</b> mm 15° 350.0 220.0 315.0 222.0 8 25.0	L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38	E51 2.05  RA 2.05  8 350.0 254.0 8 35.0	14 56 390 k 1 1 8 2 inch 15.35 9.84 13.78 10 0.31 1.26	MACON	5. 25 L 1,4 2,1 98 2,7 inch 15.35 6.69 15.35 10.50 0.31 1.57	51 .20  RA  b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0	inch 17.13 11.02 15.35 10.50 0.39 1.57	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 390 267 10	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension	44 5 5 11 11 11 11 11 11 11 11 11 11 11 11	8.51 9.69 RA Lb.in. 61,600 92,300 07,400 848,000 nches and m mm 5° 315.0 130.0 315.0 222.0 8 32.0 180.0	350 350 350 350 350 350 310 310 310 310 310 310 310 310 310 31	KNm 74.8 112.1 57.3 152.3 except when mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0	L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64	E51 2.05  RA 2.00  69,500  69,000  3,800  67,000  mm 5° 350.0  155.0  350.0  254.0  8  35.0  194.0	14 56 390	MO.0 60.0 KNm 10.7 66.0 32.9 33.6 mm 15° 390.0 250.0 350.0 254.0 8 32.0 194.0	5. 25  L 1,4 2,1 98 2,7  inch 15.35 6.69 15.35 10.50 0.31 1.57 8.46	51 .20  RA b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 390 267 10 40 215	
FT L Size Torque Ra  Te Tow TL Tp Dimension	44 5 5 19 19 19 19 19 19 19 19 19 19 19 19 19	8.51 9.69 RA Lb.in. 61,600 92,300 07,400 848,000 nches and m mm 5° 315.0 130.0 315.0 222.0 8 32.0 180.0 280.0	13.78 8.66 12.40 8.75 0.31 0.98 7.09 12.20	KNm 74.8 112.1 57.3 152.3 except who mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0 310.0	L L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64 12.20	.51 2.05 RA b.in. 9,500 69,000 3,800 67,000 mm 5° 350.0 155.0 350.0 254.0 8 35.0 194.0 310.0	14 56 390	Mono (Nm 10.7 66.0 32.9 33.6 mm 15° 390.0 250.0 8 32.0 194.0 345.0	5. 25  L 1,4 2,1 98 2,7  inch 15.35 6.69 15.35 10.50 0.31 1.57 8.46 13.58	51 .20  RA b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0 345.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46 15.16	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 390 267 10 40 215 385	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension  ß  A  B  C  D <sup>(1)</sup> E  F  K  DBC  Bolt Qty.	44 5 5 19 19 19 19 19 19 19 19 19 19 19 19 19	8.51 9.69 RA  Lb.in. 61,600 92,300 07,400 848,000 nches and m mm 5° 315.0 130.0 315.0 222.0 8 32.0 180.0 280.0 10	1350 350 350 350 350 350 350 360 360 370 370 380 370 390 370 390 390 390 390 390 390 390 390 390 39	40.0 500.0 KNm 74.8 112.1 57.3 152.3 except who mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0 310.0 10	L L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64 12.20 10	.51 2.05 RA b.in. 9,500 69,000 3,800 67,000 mm 5° 350.0 155.0 350.0 254.0 8 35.0 194.0 310.0	14 56 390	MO.0 MINION 10.7 66.0 32.9 33.6 MINION 15° 390.0 250.0 350.0 254.0 8 32.0 194.0 345.0 10	5. 25  L 1,4 2,1 98 2,7  inch 15.35 6.69 15.35 10.50 0.31 1.57 8.46 13.58 10	51 .20  RA b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0 345.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46 15.16 10	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 390 267 10 40 215 385	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension  B A B C D <sup>(1)</sup> E F K DBC Bolt Qty. H	44 5 5 19 19 19 19 19 19 19 19 19 19 19 19 19	8.51 9.69 RA  Lb.in. 61,600 92,300 07,400 848,000 nches and m mm 5° 315.0 130.0 315.0 222.0 8 32.0 180.0 280.0 10 23.0	13.78 8.66 12.40 8.75 0.31 0.98 7.09 12.20	KNm 74.8 112.1 57.3 152.3 except who mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0 310.0	L L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64 12.20 10 0.91	.51 2.05 RA b.in. 9,500 69,000 3,800 67,000 mm 5° 350.0 155.0 350.0 254.0 8 35.0 194.0 310.0 10 23.0	14 56 390	Mono (Nm 10.7 66.0 32.9 33.6 mm 15° 390.0 250.0 8 32.0 194.0 345.0	5. 25  L 1,4 2,1 98 2,7  inch 15.35 6.69 15.35 10.50 0.31 1.57 8.46 13.58 10 0.98	51 .20  RA b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0 345.0 10 25.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46 15.16	KNm 158.2 237.3 111.8 310.7 mr 5° 435 280 390 267 10 40 215 385	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension  ß  A  B  C  D <sup>(1)</sup> E  F  K  DBC  Bolt Qty.  H  X	44 5 5 19 19 19 19 19 19 19 19 19 19 19 19 19	8.51 9.69 RA  Lb.in. 61,600 92,300 07,400 848,000 nches and m mm 5° 315.0 130.0 315.0 222.0 8 32.0 180.0 280.0 10 23.0 40.0	1350 350 350 350 350 350 350 360 360 370 370 380 370 390 370 390 390 390 390 390 390 390 390 390 39	40.0 500.0 KNm 74.8 112.1 57.3 152.3 except who mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0 310.0 10	L L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64 12.20 10 0.91 1.97	.51 2.05 RA b.in. 9,500 69,000 3,800 67,000 mm 5° 350.0 254.0 8 35.0 194.0 310.0 10 23.0 50.0	14 56 390	MO.0 MINION 10.7 66.0 32.9 33.6 MINION 15° 390.0 250.0 350.0 254.0 8 32.0 194.0 345.0 10	5. 25  L 1,4 2,1 98 2,7  inch  15.35 6.69 15.35 10.50 0.31 1.57 8.46 13.58 10 0.98 2.76	51 .20  RA  b.in. 000,000 000,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0 345.0 10 25.0 70.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46 15.16 10	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 390 267 10 40 215 385 10 27	
FT L Size Torque Ra  Te Tow TL Tp Dimension  B C D(1) E F K DBC Bolt Qty. H X Y	44 5 5 19 19 19 19 19 19 19 19 19 19 19 19 19	8.51 9.69 RA  Lb.in. 61,600 92,300 07,400 848,000 100 130.0 1315.0 130.0 1315.0 222.0 8 32.0 180.0 280.0 10 23.0 40.0 15.0	1. 50 350 350 350 350 350 350 350 350 350 3	40.0 200.0  KNm 74.8  112.1 57.3 152.3  except who mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0 310.0 10 22.0 — —	L L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64 12.20 10 0.91	.51 2.05 RA b.in. 9,500 69,000 3,800 67,000 mm 5° 350.0 155.0 350.0 254.0 8 35.0 194.0 310.0 10 23.0	14 56 390	MO.0 MINION 10.7 66.0 32.9 33.6 MINION 15° 390.0 250.0 350.0 254.0 8 32.0 194.0 345.0 10	5. 25  L 1,4 2,1 98 2,7  inch 15.35 6.69 15.35 10.50 0.31 1.57 8.46 13.58 10 0.98	51 .20  RA b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0 345.0 10 25.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46 15.16 10	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 267 10 40 215 385 10	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D <sup>(1)</sup> E F K DBC Bolt Qty. H X Y	44 5 5 19 19 19 19 19 19 19 19 19 19 19 19 19	8.51 9.69 RA  Lb.in. 61,600 92,300 07,400 848,000 nches and m mm 5° 315.0 130.0 315.0 222.0 8 32.0 180.0 280.0 10 23.0 40.0	1. 50 350 350 350 350 350 350 350 350 350 3	40.0 200.0  KNm 74.8  112.1 57.3 152.3  except who mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0 310.0 10 22.0 — —	L L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64 12.20 10 0.91 1.97	.51 2.05 RA b.in. 9,500 69,000 3,800 67,000 mm 5° 350.0 254.0 8 35.0 194.0 310.0 10 23.0 50.0	14 56 390 1 1 1 2 inch 15.35 9.84 13.78 10 0.31 1.26 7.64 13.58 10 0.94 -	MO.0 MINION 10.7 66.0 32.9 33.6 MINION 15° 390.0 250.0 350.0 254.0 8 32.0 194.0 345.0 10 24.0	5. 25  L 1,4 2,1 98 2,7  inch  15.35 6.69 15.35 10.50 0.31 1.57 8.46 13.58 10 0.98 2.76	51 .20  RA  b.in. 000,000 000,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0 345.0 10 25.0 70.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46 15.16 10 1.06 -	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 267 10 40 215 385 10	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension  ß A B C D <sup>(1)</sup> E F K DBC Bolt Qty. H X Y	44 5 11  atings 66 98 56 1,3  nal Data (irr inch 12.40 8.75 0.31 1.26 7.09 11.02 10 0.91 1.57 0.59  Length L <sup>(2)</sup>	8.51 9.69 RA  Lb.in. 61,600 92,300 07,400 848,000 100 130.0 1315.0 130.0 1315.0 222.0 8 32.0 180.0 280.0 10 23.0 40.0 15.0	13.78 8.66 12.40 8.75 0.31 0.98 7.09 12.20 10 0.87	40.0 200.0  KNm 74.8  112.1 57.3 152.3  except who mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0 310.0 10 22.0 — —	L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64 12.20 10 0.91 1.97 0.63	.51 2.05 RA b.in. 9,500 69,000 3,800 67,000 mm 5° 350.0 254.0 8 35.0 194.0 310.0 10 23.0 50.0	14 56 390 1 1 1 1 2 inch 15.35 9.84 13.78 10 0.31 1.26 7.64 13.58 10 0.94	MO.0 MINION 10.7 66.0 32.9 33.6 MINION 15° 390.0 250.0 350.0 254.0 8 32.0 194.0 345.0 10 24.0	5. 25  L 1,4 2,1 98 2,7  inch  15.35 6.69 15.35 10.50 0.31 1.57 8.46 13.58 10 0.98 2.76 0.71	51 .20  RA  b.in. 000,000 000,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0 345.0 10 25.0 70.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46 15.16 10 1.06 -	KNm 158.2 237.3 111.8 310.7 mr 5° 435 280 267 10 40 215 385 10	
FT L Size Torque Ra Te Tow TL Tp Dimension  B A B C D(") E F K DBC Bolt Qty. H X Y Minimum	44: 55 11:  atings 66 98: 56 1,3 nal Data (irr inch 12.40 8.75 0.31 1.26 7.09 11.02 10 0.91 1.57 0.59 Length L <sup>(2)</sup>	8.51 9.69  RA  Lb.in. 61,600 92,300 07,400 848,000 nches and m mm 5° 315.0 130.0 315.0 222.0 8 32.0 180.0 280.0 10 23.0 40.0 15.0 / Length Conch	1. 50 350 350 350 350 350 350 350 350 350 3	40.0 200.0  KNm 74.8  112.1 57.3 152.3  except whe mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0 310.0 10 22.0 on S mm	L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64 12.20 10 0.91 1.97 0.63	.51 2.05 RA b.in. 9,500 69,000 33,800 67,000 mm 5° 350.0 155.0 350.0 254.0 8 35.0 194.0 310.0 10 23.0 50.0	14 56 390	MO.0 60.0 60.0 60.0 60.0 60.0 60.0 60.0 6	5. 25  L 1,4 2,1 98 2,7  inch 15.35 6.69 15.35 10.50 0.31 1.57 8.46 13.58 10 0.98 2.76 0.71	51 .20  RA  b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0 345.0 10 25.0 70.0 18.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46 15.16 10 1.06 -	KNm 158.2 237.3 111.8 310.7 mr 5° 435 280 267 10 40 215 385 10 27	
FT L Size  Torque Ra  Te Tow TL Tp Dimension  B A B C D(1) E F K DBC Bolt Qty. H X Y Minimum	44 5 19 19 19 19 19 19 19 19 19 19 19 19 19	8.51 9.69  RA  Lb.in. 61,600 92,300 07,400 848,000 eches and m mm 5° 315.0 130.0 315.0 222.0 8 32.0 180.0 280.0 10 23.0 40.0 15.0 / Length Conch	1. 50 350 350 350 350 350 350 350 350 350 3	40.0 200.0  KNm 74.8  112.1 57.3 152.3  except who mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0 310.0 10 22.0 - on S mm	L L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64 12.20 10 0.91 1.97 0.63	.51 2.05 RA b.in. 9,500 69,000 33,800 67,000 mm 5° 350.0 155.0 350.0 254.0 8 35.0 194.0 310.0 10 23.0 50.0	14 56 390	MO.0 60.0 60.0 60.0 60.0 60.0 60.0 60.0 6	5. 25  L 1,4 2,1 98 2,7  inch  15.35 6.69 15.35 10.50 0.31 1.57 8.46 13.58 10 0.98 2.76 0.71	51 .20  RA  b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0 345.0 10 25.0 70.0 18.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46 15.16 10 1.06 -	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 267 10 40 215 385 10 27 -	
FT L Size Torque Ra  Te Tow TL Tp Dimension  B A B C D(1) E F K DBC Bolt Qty. H X Y Minimum  ST L S	44: 55 11:  atings 66 98: 56 1,3 nal Data (in inch 12.40 5.12 12.40 8.75 0.31 1.26 7.09 11.02 10 0.91 1.57 0.59 Length L <sup>(2)</sup> 5	8.51 9.69  RA  Lb.in. 61,600 92,300 07,400 848,000 aches and m mm 5° 315.0 130.0 315.0 222.0 8 32.0 180.0 280.0 10 23.0 40.0 15.0  / Length Conch 1.77 5.51	13.78 8.66 12.40 8.75 0.31 0.98 7.09 12.20 10 0.87	40.0 200.0  KNm 74.8  112.1 57.3 152.3  except who mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0 310.0 10 22.0 - on S mm 15.0 40.0	L L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64 12.20 10 0.91 1.97 0.63	.51 2.05 RA b.in. 9,500 69,000 33,800 67,000 mm 5° 350.0 155.0 350.0 254.0 8 35.0 194.0 310.0 10 23.0 50.0 16.0	14 56 390	MO.0	5. 25  L 1,4 2,1 98 2,7  inch  15.35 6.69 15.35 10.50 0.31 1.57 8.46 13.58 10 0.98 2.76 0.71	51 .20  RA  b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0 10 25.0 70.0 18.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46 15.16 10 1.06 -	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 267 10 40 215 385 10 27 -	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension	44 5 11 11 12 14 15 16 17 17 16 17 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18	8.51 9.69  RA  Lb.in. 61,600 92,300 07,400 848,000 aches and m mm 5° 315.0 130.0 315.0 222.0 8 32.0 180.0 280.0 10 23.0 40.0 15.0  / Length Conch 1.77 5.51 1.69	1. 50  350  illimeters inch  13.78  8.66  12.40  8.75  0.31  0.98  7.09  12.20  10  0.87	40.0 200.0  KNm 74.8  112.1 57.3  152.3  except who mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0 310.0 10 22.0 - on S mm 15.0 40.0 205.0	L L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64 12.20 10 0.91 1.97 0.63	.51 2.05 RA b.in. 9,500 69,000 33,800 67,000 mm 5° 350.0 155.0 350.0 254.0 8 35.0 194.0 310.0 10 23.0 50.0 16.0	14 56 390	MO.0	5. 25  L 1,4 2,1 98 2,7  inch  15.35 6.69 15.35 10.50 0.31 1.57 8.46 13.58 10 0.98 2.76 0.71  ir 60	51 .20  RA  b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0 345.0 10 25.0 70.0 18.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46 15.16 10 1.06 -	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 267 10 40 215 385 10 27 -	
FT L Size Torque Ra  Te Tow TL Tp Dimension   B C D(1) E F K DBC Bolt Qty. H X Y Minimum  ST L S SF L FT L	44: 55 11:  atings 66 98: 56 1,3 nal Data (in inch 12.40 5.12 12.40 8.75 0.31 1.26 7.09 11.02 10 0.91 1.57 0.59 Length L <sup>(2)</sup> 5 3 5	8.51 9.69  RA  Lb.in. 61,600 92,300 07,400 848,000 aches and m mm 5° 315.0 130.0 315.0 222.0 8 32.0 180.0 280.0 10 23.0 40.0 15.0  / Length Conch 1.77 5.51 1.69 3.15	13.78 8.66 12.40 8.75 0.31 0.98 7.09 12.20 10 0.87	40.0 200.0  KNm 74.8  112.1 57.3  152.3  except whe mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0 310.0 10 22.0 - on S  mm 15.0 40.0 50.0	L L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64 12.20 10 0.91 1.97 0.63	.51 2.05 RA b.in. 9,500 69,000 33,800 67,000 mm 5° 350.0 155.0 350.0 254.0 8 35.0 194.0 310.0 10 23.0 50.0 16.0	14 56 390	MO.0	5. 25  L 1,4 2,1 98 2,7  inch  15.35 6.69 15.35 10.50 0.31 1.57 8.46 13.58 10 0.98 2.76 0.71  ir 66	51 .20  RA  b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0 345.0 10 25.0 70.0 18.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46 15.16 10 1.06 -	KNm 158.2 237.3 111.8 310.7 mm 5° 435 280 390 267 10 40 215 385 10 27 mm 1530.6 165.0 955.0 1600.6	
FT L S FF L  Size  Torque Ra  T <sub>e</sub> T <sub>ow</sub> T <sub>L</sub> T <sub>p</sub> Dimension   ß  A  B  C  D(1)  E  F  K  DBC  Bolt Qty.  H  X  Y  Minimum  ST L S  SF L	44: 55 11: 55 11: 56 11: 57 12: 40 11: 60 11	8.51 9.69  RA  Lb.in. 61,600 92,300 07,400 848,000 aches and m mm 5° 315.0 130.0 315.0 222.0 8 32.0 180.0 280.0 10 23.0 40.0 15.0  / Length Conch 1.77 5.51 1.69	13.78 8.66 12.40 8.75 0.31 0.98 7.09 12.20 10 0.87	40.0 200.0  KNm 74.8  112.1 57.3  152.3  except who mm 15° 350.0 220.0 315.0 222.0 8 25.0 180.0 310.0 10 22.0 - on S mm 15.0 40.0 205.0	L L 97 1,44 73 2,00 ere noted) inch 13.78 6.10 13.78 10 0.31 1.38 7.64 12.20 10 0.91 1.97 0.63	.51 2.05 RA b.in. 9,500 69,000 33,800 67,000 mm 5° 350.0 155.0 350.0 254.0 8 35.0 194.0 310.0 10 23.0 50.0 16.0	14 56 390	MO.0	5. 25  L 1,4 2,1 98 2,7 inch 15.35 6.69 15.35 10.50 0.31 1.57 8.46 13.58 10 0.98 2.76 0.71 ir 66	51 .20  RA  b.in. 00,000 00,000 9,500 50,000  mm 15° 390.0 170.0 390.0 267.0 8 40.0 215.0 345.0 10 25.0 70.0 18.0	inch 17.13 11.02 15.35 10.50 0.39 1.57 8.46 15.16 10 1.06 -	KNm 158.2 237.3 111.8 310.7 mn 5° 435 280 390 267 10 40 215 385 10 27 -	

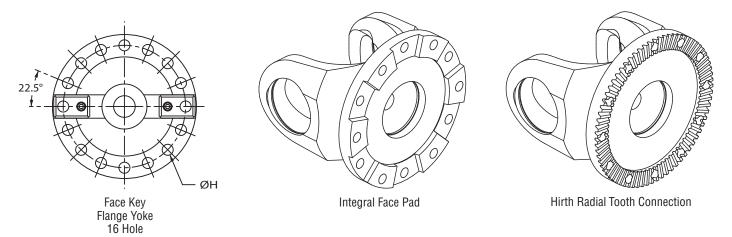


Special tube diameters available upon request
 L is minimum for ST and SF designs
 Longer/shorter length compensation available upon request. Popular flange yoke configurations shown, special designs available upon request.

### **Sizes RA440 - RA920**







The torque ratings are based on material strength. When approaching these limits the capacity of the desired flange connection should be verified. When the selection torque ( $T_s$ ) approaches the endurance torque ( $T_e$ ) or when the maximum torque approaches the peak torque capacity ( $T_p$ ) of the universal joint, integral face pads or Hirth radial tooth connections are recommended.

#### The number of pads and bolts are customized on a per application basis.

T<sub>e</sub> = normal fully reversing torque rating

 $T_{ow}$  = normal pulsating one way torque rating

 $T_L$  = B-10 bearing life rating (based on 5000 hours B-10 bearing life at 3° misalignment and 100 RPM)

 $T_p$  = peak torque or maximum allowable torque



Size	HA4			190	HAS	,,,,	HAO		HAD	~~
Torque Ra	atings		-				-			
<u> </u>	Lb.in.	KNm	Lb.in.	KNm	Lb.in.	KNm	Lb.in.	KNm	Lb.in.	KNm
T <sub>e</sub>	2,382,000	269	3,170,000	358	5,253,000	594	6,660,000	753	8,178,000	924
Tow	3,573,000	404	4,755,000	537	7,880,000	890	9,996,000	1,129	12,267,000	1,386
T <sub>L</sub>	1,665,000	188	2,126,000	240	2,994,000	338	4,224,000	477	5,959,000	673
Tp	4,890,000	553	7,180,000	811	11,000,000	1,243	15,000,000	1,695	16,700,000	1,887
	nal Data (inch					1,2.0	10,000,000	1,000	10,100,000	1,001
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
ß	15		15		15		15		15°	
A	17.32	439.9	19.28	489.7	21.62	549.1	24.41	620.0	26.77	680.0
В	13	330.2	13.50	342.9	16	406.4	18	457.2	19	482.6
C	17.32	440.0	19.28	490.0	21.65	550.0	24.41	620.0	26.77	680.0
D	12.75	323.9	13.38	339.9	16.50	419.1	17.75	450.9	19.75	501.7
E	0.40	10.2	0.47	11.9	0.47	11.9	0.47	11.9	0.59	15.0
F	1.69	42.9	1.75	44.5	2	50.8	2.12	53.8	2.12	53.8
K	10.24	260.0	10.63	270.0	12.01	305.0	13.38	340.0	15.53	395.0
DBC	15.37	390.4	17.12	434.8	19.37	492.0	21.88	555.8	23.75	603.3
	16.37	16	16	16	19.37	16	16	16	16	16
Bolt Qty.			_							
Н	1-1/8	27	1-1/4	30	1-1/4	30	1-1/2	36	1-1/2	36
X Y	3	76.2	3.50	88.9	3.94	100.1	4.50	114.3	4.50	114.3
	0.87	22.1	0.87	22.1	0.87	22.1	0.87	22.1	1	25.4
	Length L / Le					0.001.0	05.50	2 10= =	105	
FT L	73.80	1,874.5	78.10	1,983.7	90.60	2,301.2	95.50	2,425.7	105	2,667.0
S	7.50	190.5	7.50	190.5	9.50	241.3	9.50	241.3	10	254.0
FF L	40.96	1,040.4	42.52	1,080.0	48.04	1,220.2	53.52	1,359.4	62.12	1,577.8
Size	RA7	20	RA	760	RAS	300	RA86	60	RA9	20
Size Torque Ra										
		KNm	Lb.in.	760 KNm	Lb.in.	KNm	Lb.in.	KNm	RA9:	<b>20</b> KNm
	atings Lb.in. 9,800,000	KNm 1,107	Lb.in. 11,700,000	KNm 1,322	Lb.in. 13,670,000	KNm 1,545	Lb.in.	KNm 1,921	Lb.in. 20,800,000	KNm 2,350
Torque R	atings Lb.in.	KNm	Lb.in.	KNm	Lb.in.	KNm	Lb.in.	KNm	Lb.in.	KNm
Torque R	atings Lb.in. 9,800,000	KNm 1,107	Lb.in. 11,700,000	KNm 1,322	Lb.in. 13,670,000	KNm 1,545	Lb.in.	KNm 1,921	Lb.in. 20,800,000	KNm 2,350
Torque Ra	Lb.in. 9,800,000 14,701,000	KNm 1,107 1,661	Lb.in. 11,700,000 17,571,000	KNm 1,322 1,985	Lb.in. 13,670,000 20,505,000	KNm 1,545 2,317	Lb.in. 17,000,000 25,500,000	KNm 1,921 2,881	Lb.in. 20,800,000 31,200,000	KNm 2,350 3,525
Torque Ra	atings Lb.in. 9,800,000 14,701,000 7,077,000	KNm 1,107 1,661 800 2,260	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000	KNm 1,322 1,985 932 2,701	Lb.in. 13,670,000 20,505,000 9,555,000 27,900,000	KNm 1,545 2,317 1,080	Lb.in. 17,000,000 25,500,000 11,759,000	KNm 1,921 2,881 1,329	Lb.in. 20,800,000 31,200,000 14,263,000	KNm 2,350 3,525 1,612
Torque Ra	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000	KNm 1,107 1,661 800 2,260	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000	KNm 1,322 1,985 932 2,701	Lb.in. 13,670,000 20,505,000 9,555,000 27,900,000	KNm 1,545 2,317 1,080	Lb.in. 17,000,000 25,500,000 11,759,000	KNm 1,921 2,881 1,329	Lb.in. 20,800,000 31,200,000 14,263,000	KNm 2,350 3,525 1,612
Torque Ra	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 onal Data (inch	KNm 1,107 1,661 800 2,260 es and mill	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000 limeters excep	KNm 1,322 1,985 932 2,701 ot where not	Lb.in. 13,670,000 20,505,000 9,555,000 27,900,000 ed)	KNm 1,545 2,317 1,080 3,153	Lb.in. 17,000,000 25,500,000 11,759,000 34,680,000	KNm 1,921 2,881 1,329 3,919	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000	KNm 2,350 3,525 1,612 4,797
Torque Range Town TL Tp Dimension	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 onal Data (inch	KNm 1,107 1,661 800 2,260 es and mill	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000 limeters exceptinch	KNm 1,322 1,985 932 2,701 ot where not	Lb.in. 13,670,000 20,505,000 9,555,000 27,900,000 <b>ed)</b> inch	KNm 1,545 2,317 1,080 3,153	Lb.in. 17,000,000 25,500,000 11,759,000 34,680,000 inch	KNm 1,921 2,881 1,329 3,919	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000 inch	KNm 2,350 3,525 1,612 4,797
Torque Range Town Town TL Tp Dimension $\mathbb{S}$	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 onal Data (inch inch	KNm 1,107 1,661 800 2,260 es and mill mm	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000 limeters exceptinch	KNm 1,322 1,985 932 2,701 of where not mm	Lb.in. 13,670,000 20,505,000 9,555,000 27,900,000 <b>ed)</b> inch	KNm 1,545 2,317 1,080 3,153 mm	Lb.in. 17,000,000 25,500,000 11,759,000 34,680,000 inch	KNm 1,921 2,881 1,329 3,919 mm	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000 inch	KNm 2,350 3,525 1,612 4,797
Torque Range Town TL Tp Dimension	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 onal Data (inch inch 15 28.35	KNm 1,107 1,661 800 2,260 es and mill mm	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000 imeters exceptinch 15 29.92	KNm 1,322 1,985 932 2,701 of where not mm 5° 760.0	Lb.in. 13,670,000 20,505,000 9,555,000 27,900,000 <b>ed)</b> inch	KNm 1,545 2,317 1,080 3,153 mm	Lb.in. 17,000,000 25,500,000 11,759,000 34,680,000 inch 15 33.85	KNm 1,921 2,881 1,329 3,919 mm	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000 inch 15° 36.22	KNm 2,350 3,525 1,612 4,797 mm
Torque Range Town TL Tp Dimension B A B	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 onal Data (inch inch 15 28.35 20	KNm 1,107 1,661 800 2,260 es and mill mm 5° 720.0 508.0	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000 limeters exceptinch 15 29.92 21	KNm 1,322 1,985 932 2,701 ot where not mm 5° 760.0 533.4	Lb.in. 13,670,000 20,505,000 9,555,000 27,900,000 ed) inch 15 31.50 22	KNm 1,545 2,317 1,080 3,153 mm 6° 800.0 558.8	Lb.in. 17,000,000 25,500,000 11,759,000 34,680,000 inch 15 33.85 24	KNm 1,921 2,881 1,329 3,919 mm ° 860.0 609.6	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000 inch 15° 36.22 25	KNm 2,350 3,525 1,612 4,797 mm 920.0 635.0
Torque Range Town TL Tp Dimension B A B C	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 inch inch 28.35 20 28.35	KNm 1,107 1,661 800 2,260 es and mill mm 720.0 508.0 720.0	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000 limeters except inch 15 29.92 21 29.92	KNm 1,322 1,985 932 2,701 of where not mm 5° 760.0 533.4 760.0	Lb.in. 13,670,000 20,505,000 9,555,000 27,900,000 ed) inch 15 31.50 22 31.50	KNm 1,545 2,317 1,080 3,153 mm 5° 800.0 558.8 800.0	Lb.in. 17,000,000 25,500,000 11,759,000 34,680,000  inch 15 33.85 24 33.85	KNm 1,921 2,881 1,329 3,919 mm ° 860.0 609.6 860.0	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000 inch 15° 36.22 25 36.22	KNm 2,350 3,525 1,612 4,797 mm 920.0 635.0 920.0
Te Tow TL Tp Dimension	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 inch inch 28.35 20 28.35 21.75	KNm 1,107 1,661 800 2,260 es and mill mm 5° 720.0 508.0 720.0 552.5	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000 limeters exceptinch 15 29.92 21 29.92 23.25	KNm 1,322 1,985 932 2,701  It where not mm  70 760.0 533.4 760.0 590.6	Lb.in. 13,670,000 20,505,000 9,555,000 27,900,000 ed) inch 15 31.50 22 31.50 24.75	KNm 1,545 2,317 1,080 3,153 mm ° 800.0 558.8 800.0 628.7	Lb.in. 17,000,000 25,500,000 11,759,000 34,680,000  inch 15 33.85 24 33.85 27	KNm 1,921 2,881 1,329 3,919 mm ° 860.0 609.6 860.0 685.8	Lb.in.  20,800,000  31,200,000  14,263,000  42,450,000  inch  15°  36.22  25  36.22  28	KNm 2,350 3,525 1,612 4,797 mm 920.0 635.0 920.0 711.2
Te Tow TL Tp Dimension  B A B C D E	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 nal Data (inch inch 28.35 20 28.35 21.75 0.62 2.25	KNm 1,107 1,661 800 2,260 es and mill mm 5° 720.0 508.0 720.0 552.5 15.7 57.2	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000 limeters exceptinch 15 29.92 21 29.92 23.25 0.62 2.38	KNm 1,322 1,985 932 2,701 of where not mm 5° 760.0 533.4 760.0 590.6 15.7 60.5	Lb.in.  13,670,000  20,505,000  9,555,000  27,900,000  ed)  inch  15  31.50  22  31.50  24.75  0.62  2.50	KNm 1,545 2,317 1,080 3,153 mm 3,000 558.8 800.0 628.7 15.7 63.5	Lb.in. 17,000,000 25,500,000 11,759,000 34,680,000  inch 15 33.85 24 33.85 27 0.62 2.62	KNm 1,921 2,881 1,329 3,919 mm ° 860.0 609.6 860.0 685.8 15.7 66.5	Lb.in.  20,800,000  31,200,000  14,263,000  42,450,000  inch  15°  36.22  25  36.22  28  0.75  2.75	KNm 2,350 3,525 1,612 4,797  mm 920.0 635.0 920.0 711.2 19.1 69.9
Torque Range Town TL Tp Dimension B A B C D E F K	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 nal Data (inch inch 28.35 20 28.35 21.75 0.62 2.25 16.44	KNm 1,107 1,661 800 2,260 res and mill mm 5° 720.0 508.0 720.0 552.5 15.7 57.2 417.6	Lb.in.  11,700,000  17,571,000  8,248,000  23,900,000  limeters excep inch  15  29.92  21  29.92  23.25  0.62  2.38  17.35	KNm 1,322 1,985 932 2,701  at where not mm 5° 760.0 533.4 760.0 590.6 15.7 60.5 440.7	Lb.in. 13,670,000 20,505,000 9,555,000 27,900,000 ed) inch 15 31.50 22 31.50 24.75 0.62 2.50 18.27	KNm 1,545 2,317 1,080 3,153 mm 5° 800.0 558.8 800.0 628.7 15.7 63.5 464.1	Lb.in.  17,000,000  25,500,000  11,759,000  34,680,000  inch  15  33.85  24  33.85  27  0.62  2.62  19.64	KNm 1,921 2,881 1,329 3,919 mm 6° 860.0 609.6 860.0 685.8 15.7 66.5 498.9	Lb.in.  20,800,000  31,200,000  14,263,000  42,450,000  inch  15°  36.22  25  36.22  28  0.75  2.75  20.47	KNm 2,350 3,525 1,612 4,797 mm 920.0 635.0 920.0 711.2 19.1 69.9 519.9
Torque Range Town TL Tp Dimension B A B C D E F K DBC	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 nal Data (inch inch 28.35 20 28.35 21.75 0.62 2.25 16.44 25.75	KNm 1,107 1,661 800 2,260 res and mill mm 5° 720.0 508.0 720.0 552.5 15.7 57.2 417.6 654.1	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000 limeters excep inch 15 29.92 21 29.92 23.25 0.62 2.38 17.35 27.38	KNm 1,322 1,985 932 2,701 of where not mm 5° 760.0 533.4 760.0 590.6 15.7 60.5 440.7	Lb.in. 13,670,000 20,505,000 9,555,000 27,900,000 ed) inch 15 31.50 22 31.50 24.75 0.62 2.50 18.27 28.88	KNm 1,545 2,317 1,080 3,153 mm 5° 800.0 558.8 800.0 628.7 15.7 63.5 464.1 733.6	Lb.in. 17,000,000 25,500,000 11,759,000 34,680,000  inch 15 33.85 24 33.85 27 0.62 2.62 19.64 31.25	KNm 1,921 2,881 1,329 3,919 mm ° 860.0 609.6 860.0 685.8 15.7 66.5	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000  inch 15° 36.22 25 36.22 28 0.75 2.75 20.47 33.50	KNm 2,350 3,525 1,612 4,797  mm 920.0 635.0 920.0 711.2 19.1 69.9
Te Tow TL Tp Dimension     B C D E F K DBC Bolt Qty.	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 nal Data (inch inch 28.35 20 28.35 21.75 0.62 2.25 16.44 25.75 16	KNm 1,107 1,661 800 2,260 res and mill mm 5° 720.0 508.0 720.0 552.5 15.7 57.2 417.6 654.1	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000 limeters excep inch 15 29.92 21 29.92 23.25 0.62 2.38 17.35 27.38 16	KNm 1,322 1,985 932 2,701 of where not mm 5° 760.0 533.4 760.0 590.6 15.7 60.5 440.7 695.5 16	Lb.in. 13,670,000 20,505,000 9,555,000 27,900,000 ed) inch 15 31.50 22 31.50 24.75 0.62 2.50 18.27 28.88 16	KNm 1,545 2,317 1,080 3,153 mm 9 800.0 558.8 800.0 628.7 15.7 63.5 464.1 733.6 16	Lb.in.  17,000,000  25,500,000  11,759,000  34,680,000  inch  15  33.85  24  33.85  27  0.62  2.62  19.64  31.25  16	KNm 1,921 2,881 1,329 3,919  mm  860.0 609.6 860.0 685.8 15.7 66.5 498.9 793.8 16	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000  inch 15° 36.22 25 36.22 28 0.75 2.75 20.47 33.50 16	KNm 2,350 3,525 1,612 4,797  mm  920.0 635.0 920.0 711.2 19.1 69.9 519.9 850.9
Torque Range Town TL Tp Dimension State A B C D E F K DBC Bolt Qty. H	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 anal Data (inch inch 28.35 20 28.35 21.75 0.62 2.25 16.44 25.75 16 1-1/2	KNm 1,107 1,661 800 2,260 es and mill mm 5° 720.0 508.0 720.0 552.5 15.7 57.2 417.6 654.1 16 36	Lb.in.  11,700,000  17,571,000  8,248,000  23,900,000  limeters excep  inch  15  29.92  21  29.92  23.25  0.62  2.38  17.35  27.38  16  1-1/2	KNm 1,322 1,985 932 2,701  of where not mm 59 760.0 533.4 760.0 590.6 15.7 60.5 440.7 695.5 16 36	Lb.in.  13,670,000 20,505,000 9,555,000 27,900,000 ed)  inch  15 31.50 22 31.50 24.75 0.62 2.50 18.27 28.88 16 1-1/2	KNm 1,545 2,317 1,080 3,153 mm 600.0 558.8 800.0 628.7 15.7 63.5 464.1 733.6 16 36	Lb.in.  17,000,000  25,500,000  11,759,000  34,680,000  inch  15  33.85  24  33.85  27  0.62  2.62  19.64  31.25  16  1-1/2	KNm 1,921 2,881 1,329 3,919  mm  860.0 609.6 860.0 685.8 15.7 66.5 498.9 793.8 16 36	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000  inch 15° 36.22 25 36.22 28 0.75 2.75 20.47 33.50 16 1-1/2	80.0 KNm 2,350 3,525 1,612 4,797 mm 920.0 635.0 920.0 711.2 19.1 69.9 519.9 850.9 16 36
Torque Range Town TL Tp Dimension State St	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 anal Data (inch inch 28.35 20 28.35 21.75 0.62 2.25 16.44 25.75 16 1-1/2 4.50	KNm 1,107 1,661 800 2,260 les and mill mm 5° 720.0 508.0 720.0 552.5 15.7 57.2 417.6 654.1 16 36 114.3	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000 limeters excep inch 15 29.92 21 29.92 23.25 0.62 2.38 17.35 27.38 16 1-1/2 4.50	KNm 1,322 1,985 932 2,701 of where not mm 5 760.0 533.4 760.0 590.6 15.7 60.5 440.7 695.5 16 36 114.3	Lb.in.  13,670,000 20,505,000 9,555,000 27,900,000 ed)  inch  15 31.50 22 31.50 24.75 0.62 2.50 18.27 28.88 16 1-1/2 4.50	KNm 1,545 2,317 1,080 3,153  mm 6 800.0 558.8 800.0 628.7 15.7 63.5 464.1 733.6 16 36 114.3	Lb.in.  17,000,000  25,500,000  11,759,000  34,680,000  inch  15  33.85  24  33.85  27  0.62  2.62  19.64  31.25  16  1-1/2  4.50	KNm 1,921 2,881 1,329 3,919  mm 6 860.0 609.6 860.0 685.8 15.7 66.5 498.9 793.8 16 36 114.3	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000  inch 15° 36.22 25 36.22 28 0.75 2.75 20.47 33.50 16 1-1/2 5	KNm 2,350 3,525 1,612 4,797  mm 920.0 635.0 920.0 711.2 19.1 69.9 519.9 850.9 16 36 127.0
Torque Range Town Town Town Town Town Town Town Town	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 anal Data (inch inch 28.35 20 28.35 21.75 0.62 2.25 16.44 25.75 16 1-1/2 4.50 1.06	KNm 1,107 1,661 800 2,260 les and mill mm 5° 720.0 508.0 720.0 552.5 15.7 57.2 417.6 654.1 16 36 114.3 26.9	Lb.in. 11,700,000 17,571,000 8,248,000 23,900,000 limeters excep inch 15 29.92 21 29.92 23.25 0.62 2.38 17.35 27.38 16 1-1/2 4.50 1.12	KNm 1,322 1,985 932 2,701  of where not mm 59 760.0 533.4 760.0 590.6 15.7 60.5 440.7 695.5 16 36	Lb.in.  13,670,000 20,505,000 9,555,000 27,900,000 ed)  inch  15 31.50 22 31.50 24.75 0.62 2.50 18.27 28.88 16 1-1/2	KNm 1,545 2,317 1,080 3,153 mm 600.0 558.8 800.0 628.7 15.7 63.5 464.1 733.6 16 36	Lb.in.  17,000,000  25,500,000  11,759,000  34,680,000  inch  15  33.85  24  33.85  27  0.62  2.62  19.64  31.25  16  1-1/2	KNm 1,921 2,881 1,329 3,919  mm  860.0 609.6 860.0 685.8 15.7 66.5 498.9 793.8 16 36	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000  inch 15° 36.22 25 36.22 28 0.75 2.75 20.47 33.50 16 1-1/2	920.0 635.0 920.0 711.2 19.1 69.9 519.9 850.9 16 36
Torque Range Town Town Town Town Town Town Town Town	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 Inal Data (inch inch 28.35 20 28.35 21.75 0.62 2.25 16.44 25.75 16 1-1/2 4.50 1.06 Length L / Le	KNm 1,107 1,661 800 2,260 les and mill mm 5° 720.0 508.0 720.0 552.5 15.7 57.2 417.6 654.1 16 36 114.3 26.9 Ingth Comp	Lb.in.  11,700,000  17,571,000  8,248,000  23,900,000  limeters excep  inch  15  29.92  21  29.92  23.25  0.62  2.38  17.35  27.38  16  1-1/2  4.50  1.12  censation \$	KNm 1,322 1,985 932 2,701 of where not mm 5° 760.0 533.4 760.0 590.6 15.7 60.5 440.7 695.5 16 36 114.3 28.4	Lb.in.  13,670,000 20,505,000 9,555,000 27,900,000 ed)  inch  15 31.50 22 31.50 24.75 0.62 2.50 18.27 28.88 16 1-1/2 4.50 1.19	KNm 1,545 2,317 1,080 3,153  mm 6 800.0 558.8 800.0 628.7 15.7 63.5 464.1 733.6 16 36 114.3 30.2	Lb.in.  17,000,000  25,500,000  11,759,000  34,680,000  inch  15  33.85  24  33.85  27  0.62  2.62  19.64  31.25  16  1-1/2  4.50  1.25	KNm 1,921 2,881 1,329 3,919  mm  860.0 609.6 860.0 685.8 15.7 66.5 498.9 793.8 16 36 114.3 31.8	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000  inch 15° 36.22 25 36.22 28 0.75 20.47 33.50 16 1-1/2 5 1.38	KNm 2,350 3,525 1,612 4,797  mm 920.0 635.0 920.0 711.2 19.1 69.9 519.9 850.9 16 36 127.0 35.1
Torque Range Town Town Town Town Town Town Town Town	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 Inal Data (inch inch 28.35 20 28.35 21.75 0.62 2.25 16.44 25.75 16 1-1/2 4.50 1.06 Length L / Le	KNm 1,107 1,661 800 2,260 les and mill mm 5° 720.0 508.0 720.0 552.5 15.7 57.2 417.6 654.1 16 36 114.3 26.9 Ingth Comp	Lb.in.  11,700,000  17,571,000  8,248,000  23,900,000  limeters excep  inch  15  29.92  21  29.92  23.25  0.62  2.38  17.35  27.38  16  1-1/2  4.50  1.12  censation \$  113.50	KNm 1,322 1,985 932 2,701 of where not mm 5° 760.0 533.4 760.0 590.6 15.7 60.5 440.7 695.5 16 36 114.3 28.4	Lb.in.  13,670,000 20,505,000 9,555,000 27,900,000 ed)  inch  15 31.50 22 31.50 24.75 0.62 2.50 18.27 28.88 16 1-1/2 4.50 1.19	KNm 1,545 2,317 1,080 3,153  mm 6 800.0 558.8 800.0 628.7 15.7 63.5 464.1 733.6 16 36 114.3 30.2	Lb.in.  17,000,000  25,500,000  11,759,000  34,680,000  inch  15  33.85  24  33.85  27  0.62  2.62  19.64  31.25  16  1-1/2  4.50  1.25	KNm 1,921 2,881 1,329 3,919  mm  860.0 609.6 860.0 685.8 15.7 66.5 498.9 793.8 16 36 114.3 31.8	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000  inch 15° 36.22 25 36.22 28 0.75 20.47 33.50 16 1-1/2 5 1.38	KNm 2,350 3,525 1,612 4,797  mm 920.0 635.0 920.0 711.2 19.1 69.9 519.9 850.9 16 36 127.0 35.1
Torque Range Town Town Town Town Town Town Town Town	atings Lb.in. 9,800,000 14,701,000 7,077,000 20,000,000 Inal Data (inch inch 28.35 20 28.35 21.75 0.62 2.25 16.44 25.75 16 1-1/2 4.50 1.06 Length L / Le	KNm 1,107 1,661 800 2,260 les and mill mm 5° 720.0 508.0 720.0 552.5 15.7 57.2 417.6 654.1 16 36 114.3 26.9 Ingth Comp	Lb.in.  11,700,000  17,571,000  8,248,000  23,900,000  limeters excep  inch  15  29.92  21  29.92  23.25  0.62  2.38  17.35  27.38  16  1-1/2  4.50  1.12  censation \$	KNm 1,322 1,985 932 2,701 of where not mm 5° 760.0 533.4 760.0 590.6 15.7 60.5 440.7 695.5 16 36 114.3 28.4	Lb.in.  13,670,000 20,505,000 9,555,000 27,900,000 ed)  inch  15 31.50 22 31.50 24.75 0.62 2.50 18.27 28.88 16 1-1/2 4.50 1.19	KNm 1,545 2,317 1,080 3,153  mm 6 800.0 558.8 800.0 628.7 15.7 63.5 464.1 733.6 16 36 114.3 30.2	Lb.in.  17,000,000  25,500,000  11,759,000  34,680,000  inch  15  33.85  24  33.85  27  0.62  2.62  19.64  31.25  16  1-1/2  4.50  1.25	KNm 1,921 2,881 1,329 3,919  mm  860.0 609.6 860.0 685.8 15.7 66.5 498.9 793.8 16 36 114.3 31.8	Lb.in. 20,800,000 31,200,000 14,263,000 42,450,000  inch 15° 36.22 25 36.22 28 0.75 20.47 33.50 16 1-1/2 5 1.38	KNm 2,350 3,525 1,612 4,797  mm 920.0 635.0 920.0 711.2 19.1 69.9 519.9 850.9 16 36 127.0 35.1

RA550

RA620

RA680

Size

RA440

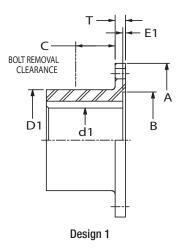
RA490

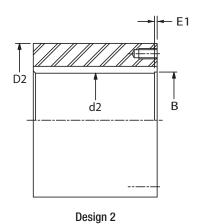


# **Companion Flange Dimensions**

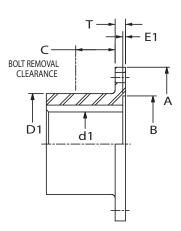
### 1000 Series

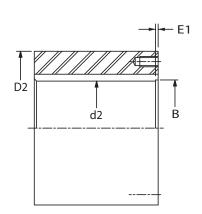
# Sizes RA1310 - RA1550 - RA1880 - RA1910





### Sizes RA1610 - RA1880



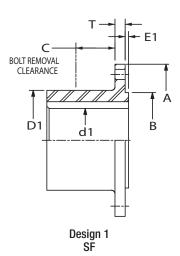


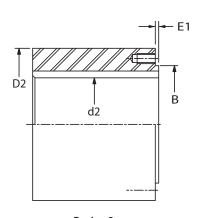
Size	RA1310	RA1350/RA1410	RA1480/RA1550	RA1610	RA1710	RA1810	RA1880/RA1910
	inch mm	inch mm	inch mm	inch mm	inch mm	inch mm	inch mm
А	3.88 98.6	4.63 117.6	5.88 149.4	6.88 174.8	8 203.2	8 203.2	9.63 244.6
В	2.38 60.5	2.75 69.9	3.75 95.3	6.62 168.1	7.75 196.9	7.75 196.9	7 177.8
Е	0.08 2.0	0.08 2.0	0.08 2.0	0.04 1.0	0.04 1.0	0.04 1.4	0.11 2.8
F	0.38 9.7	0.50 12.7	0.38 9.7	0.38 9.7	0.38 9.7	0.50 12.7	0.38 9.7
L1	2 50.8	2 50.8	2.50 63.5	3.50 88.9	4 101.6	4 101.6	4.50 114.3
D1	2.44 62.0	2.88 73.2	3.75 95.3	5.25 133.4	6.38 162.1	6.38 162.1	6.88 174.8
d1	1.69 42.9	1.88 47.8	2.44 62.0	3.12 88.9	4 101.6	4 101.6	4.50 114.3
L2	2.50 63.5	3 76.2	3 88.9	5 127.0	6 152.4	6 152.4	6 152.4
d2	2.38 60.5	2.75 69.9	3.75 95.3	4.75 120.7	5.50 139.7	5.50 139.7	6.50 165.1

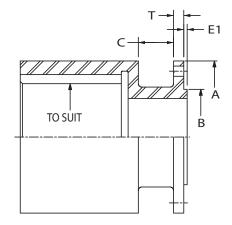
# **Companion Flange Dimensions**

# **Metric Series**

**Sizes RA58 - RA435** 







Design 2 SLF

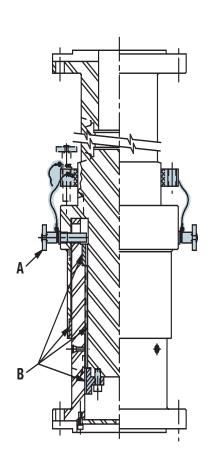
Design 3

Size	RA	<b>.</b> 58	RA58/I	RA65	RA65/F	RA75	RA75/I	RA90	RA90/RA100	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
А	2.28	58.0	2.56	65.0	2.95	75.0	3.54	90.0	3.94	100.0
В	1.18	30.0	1.38	35.0	1.65	42.0	1.85	47.0	2.24	84.0
Е	0.054	1.4	0.062	1.6	0.074	1.9	0.094	2.4	0.094	2.4
F	_	_	_	_	_	_	0.25	6.4	0.25	6.4
L1	_	_	_	_	_	_	2	50.8	2	50.8
D1	_	_	_	_	_	_	2.12	53.8	2.31	58.7
d1	_	_	_	_	_	_	1.25	31.8	1.62	41.1
L2	2	50.8	2	50.8	2.25	57.2	2.50	63.5	3	76.2
d2	1.18	30.0	1.38	35.1	1.65	41.9	1.85	47.0	2.24	56.9

Size	RA100/RA1	120/RA120HD	RA100	/RA150	RA150	HD/RA180	RA180/RA	225/RA250	RA225/RA250/RA285	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
Α	4.73	120.0	5.91	150.0	7.09	180.0	8.86	225.0	9.84	250.0
В	4	101.5	5.118	130.0	4.330	110.0	5.512	140.0	5.512	140.0
Е	0.094	2.4	0.094	2.4	0.094	2.4	0.157	4.0	0.197	5.0
F	0.38	9.7	0.44	11.2	0.50	12.7	0.63	16.0	0.75	19.1
L1	3	76.2	4	101.6	4	101.6	5.50	139.7	6	152.4
D1	3.30	83.8	4.31	109.5	5.19	131.8	6.59	167.4	7.44	189.0
d1	2.25	57.2	2.88	73.2	3.44	87.4	4.44	112.8	4.94	125.5
L2	4	101.6	5	127.0	4.50	114.3	7.25	184.2	8.25	209.6
d2	2.95	74.9	3.54	89.9	4.13	104.9	5.88	149.4	6.56	166.6

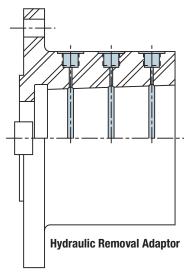
Size	RA285	5/RA315	RA315	/RA350	RA350	/RA390	RA390	/RA435	RA435	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
Α	11.22	285.0	12.40	315.0	13.78	350.0	15.35	390.0	15.35	390.0
В	6.890	175.0	6.890	175.0	8.661	220.0	9.843	250.0	9.843	250.0
Е	0.236	6.0	0.236	6.0	0.276	7.0	0.276	7.0	0.276	7.0
F	0.81	20.6	0.88	22.4	1	25.4	1.12	28.4	1.12	28.4
L1	7	177.8	8	203.2	9	228.6	10	254.0	10	254.0
D1	8.41	213.6	9.69	246.1	10.88	276.4	12.09	307.1	12.09	307.1
d1	5.56	141.2	6.44	163.6	7.25	184.1	8.06	204.7	8.06	204.7
L2	9.38	238.3	10.25	260.3	11.25	285.8	12.25	311.1	12.25	311.1
d2	7.50	190.5	8.25	209.6	9	228.6	10	254.0	10	254.0

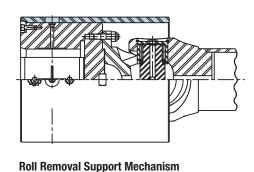
# **Design Variations and Custom Applications**

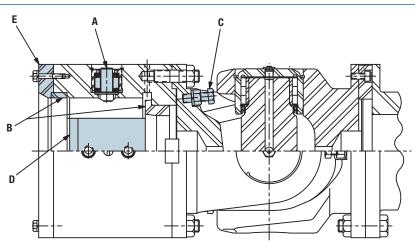


### **Vertical Edger Design**

- A. Locking Pin Arrangement
- B. Long Travel Shaft With Bearing Support





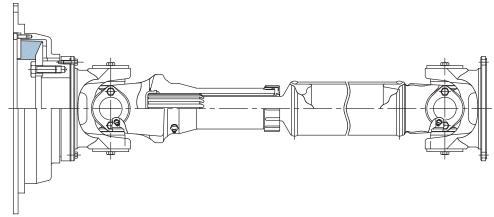


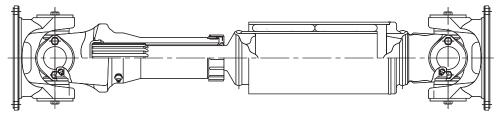
- A. Detent Assembly
- **B.** Replaceable Pilot Bearing
- **C.** Angle Limiters
- D. Replaceable Wear Keys
- E. Hardened, Chamfered End Plate

# **Specialty Shafts**

### **Tosionally Dampened Driveshafts**

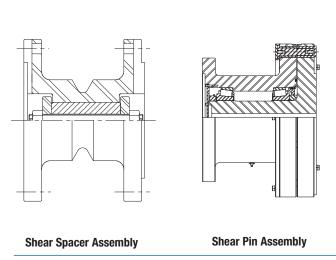
Renold offers torsionally dampened driveshafts designed to reduce the torsional stress between the drive source and the driven unit. Through use of a torsionally dampened driveshaft resonant frequencies are reduced to below the operating speed, and torque spikes caused by resonance can be brought to within permissible levels. Two designs are available, engine flywheel mounted and integral to the drive shaft. Individual design is based on the application requirements. Typical applications include dynamometers, boat drives, construction machines et al.

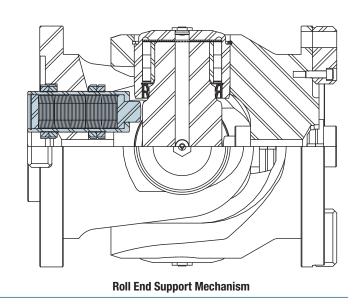


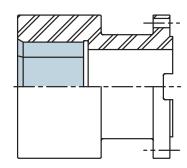




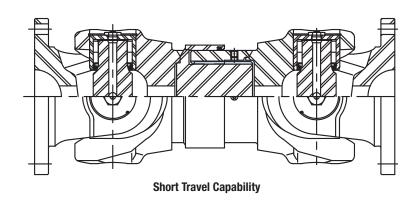


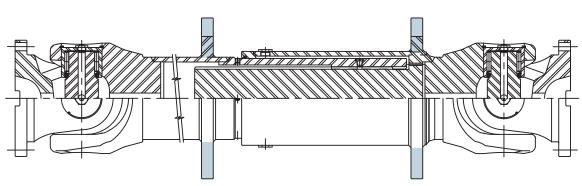






**Developed and Hardened Roll End Bore** 



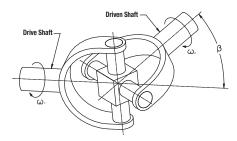


Long Travel Capability With Expansion and Contraction Flanges



# **Kinematics and Motion Characteristics**

When a universal joint is operated at an angle (ß), non-uniform motion is developed. With the driving yoke of the joint operating at a uniform rotational velocity to  $(\omega_1)$ , the driven yoke rotates non-uniformly with respect to angular displacement, velocity  $(\omega_2)$ , and acceleration.



The average angular displacement and velocity is uniform. That is, if the driving yoke rotates one revolution, the driven yoke also rotates one revolution. However, during this one revolution, the incremental angular displacement and instantaneous angular velocity and acceleration are not transmitted uniformly through the joint. The angular displacement of the driven yoke during one revolution lags and leads the driving yoke twice.

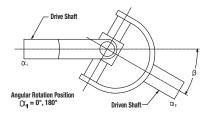
With a constant angular velocity  $(\omega_1)$ , of the driving yoke, the driven yoke has a maximum difference of output angular velocity  $(\phi)$ , with respect to the driving yoke when the driving yoke lies in the plane of the joint angle and also when the driving yoke is normal or perpendicular to this plane. The driven yoke has the same angular velocity as the driving yoke at approximately 45° from the joint angle plane for small angles.

The maximum instantaneous angular acceleration and deceleration of the driven yoke occurs when the angular velocity of the driven yoke is the same as the driving yoke. Also, the maximum acceleration and deceleration coincide with the maximum lead and lag respectively. The incremental angular displacement, velocity and acceleration increase as the joint angle is increased, but at an increasing rate.

For dynamic rotation the angular velocity of the driven yoke  $(\omega_2)$ , can be determined for a given angular displacement  $(\alpha_4)$ , with the formula

$$\omega_2 = \left(\frac{\cos\beta \times \omega_1}{1-\sin^2\alpha_1 \times \sin^2\beta}\right)$$

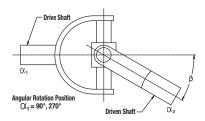
During one revolution of the drive yoke the driven yoke will reach a maximum angular velocity two times at  $\alpha = 0^{\circ}$  and 180°.



The maximum angular velocity will be

$$\omega_2 \max = \frac{\omega_1}{\cos \Omega}$$

The driven yoke will also reach a minimum angular velocity two times during one revolution at  $\alpha = 90^{\circ}$  and  $270^{\circ}$ .



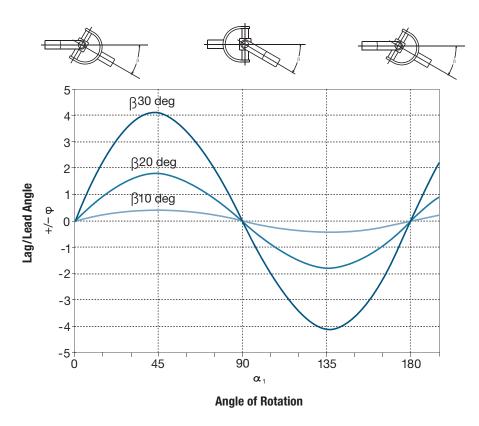
The minimum angular velocity will be

$$\omega_{2}$$
min = cosß  $\omega_{1}$ 

Lead and lag angles  $(\omega)$  of the driven shaft can be determined by the following equations

$$\varphi = \tan^{-1} \left( \frac{\tan \alpha_2 - \tan \alpha_1}{1 + \tan \alpha_1 x \tan \alpha_2} \right)$$

$$\alpha_2 = \tan^{-1} \left( \frac{1}{\cos \beta} \times \tan \alpha_1 \right)$$



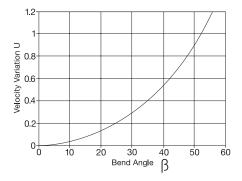
Lag and lead angle ( $\varphi$ ) as a function of angular rotation ( $\alpha$ ) of the joint and bend angle ( $\beta$ ).





Velocity variation (U) is a means for comparison of the angular velocities of the drive and driven shafts. Velocity variation (U) is calculated using the formula

$$U = \left(\frac{\omega_2 max - \omega_2 min}{\omega_1}\right) = tanß x sinß$$



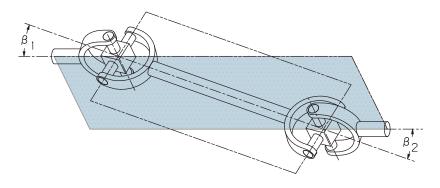
As a result of the non-uniform motion of a universal joint, few applications are suitable for a single universal joint. However, by placing two universal joints in tandem the irregularities of a single joint can be compensated. By arranging the two universal joints in either a "Z" or "W" bend configuration with joint angles  $\[mathbb{B}_1\]$  and  $\[mathbb{B}_2\]$ , equal, the velocity variations developed in the first joint are in effect cancelled by the velocity variations in the second joint.



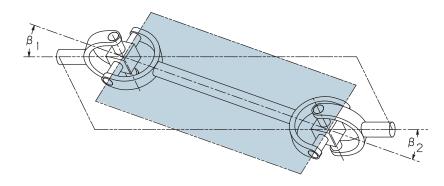


Synchronous rotation of the drive and driven shafts is possible provided that all three of the following conditions are met:

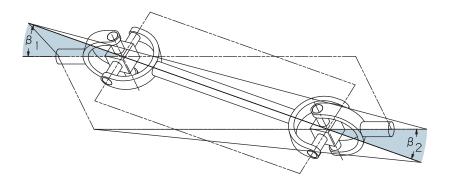
1. The axis of all shaft sections lie in the same plane.



2. The bearing bores of the inboard yokes of the center section lie in the same plane.



3. The bend angles  $\beta_1$  and  $\beta_2$  are equal.



This ideal or phased arrangement will result in homokinetic operation of the universal joint driveline assembly. Failure to meet one or more of these requirements will result in some level of velocity fluctuation in the driven shaft. The acceptability of this velocity fluctuation is a function of the speed, system mass and the sensitivity of the application.



# **Bore Tolerances and Weights**

#### **Recommended Bore Tolerances**

- · Recommended standard bore tolerances for interference fits are shown in table (right).
- Bore tolerances conform to AGMA 9002-A86 standards.

#### Interference Fits

Unless specified, bores will be furnished with an interference fit.

When **shaft sizes only** are stated on order and they consist of fractional or decimal dimensions without tolerance, the bore will be sized for an interference fit in accordance with table (right). If exact shaft size and tolerance do not agree with tables, the smallest shaft dimension will be considered "basic" and the standard negative bore tolerance will be applied.

**Example: Interference Fit** 

Shaft Size - 2.000 (Basic Size)

1.999 (With Tolerance)

**Bore Size** - 1.999

1.998

Interference Fit (Inches)				
Nominal Bore Size Over Thru	Shaft Tolerance	Bore Tolerance	Interference Range	
0.0000 / 1.5000	+0000 /0005	0005 /0010	0000 /0010	
1.5000 / 3.0000		0010 /0020	0000 /0020	
3.0000 / 4.0000		0015 /0030	0005 /0030	
4.0000 / 5.0000		0020 /0035	0010 /0035	
5.0000 / 7.0000		0025 /0040	0015 /0040	
7.0000 / 8.0000		0030 /0050	0020 /0050	
8.0000 / 9.0000		0035 /0055	0025 /0055	
9.0000 / 10.0000		0040 /0060	0030 /0060	
10.0000 / 11.0000		0045 /0065	0035 /0065	
11.0000 / 12.0000	+.0000 /0010	0050 /0070	0040 /0070	
12.0000 / 13.0000		0055 /0075	0045 /0075	
13.0000 / 14.0000		0060 /0080	0050 /0080	
14.0000 / 15.0000		0065 /0085	0055 /0085	
15.0000 / 16.0000		0065 /0090	0055 /0090	
16.0000 / 17.0000		0070 /0095	0060 /0095	
17.0000 / 18.0000		0075 /0100	0065 /0100	
18.0000 / 19.0000		0080 /0105	0070 /0105	
19.0000 / 20.0000		0085 /0110	0075 /0110	
20.0000 / 22.0000		0100 /0130	0080 /0130	
22.0000 / 24.0000	+.0000 /0020	0110 /0140	0090 /0140	
24.0000 / 26.0000		0120 /0150	0100 /0150	

Standard Recommended Keyways (Inches)				
Nominal Bore Range Keyway				
Over Thru	Width	Depth Sq. Key	Depth Red. Key	
.312 / .438	.094	.047	-	
.438 / .562	.125	.063	.047	
.562 / .875	.188	.094	.062	
.875 / 1.250	.250	.125	.094	
1.250 / 1.375	.312	.156	.125	
1.375 / 1.750	.375	.188	.125	
1.750 / 2.250	.500	.250	.188	
2.250 / 2.750	.625	.313	.219	
2.750 / 3.250	.750	.375	.250	
3.250 / 3.750	.875	.438	.313	
3.750 / 4.500	1.000	.500	.375	
4.500 / 5.500	1.250	.625	.438	
5.500 / 6.500	1.500	.750	.500	
6.500 / 7.500	1.750	.875	.750	
7.500 / 9.000	2.000	1.000	.750	
9.000 / 11.000	2.500	1.250	.875	
11.000 / 13.000	3.000	1.500	1.000	
13.000 / 15.000	3.500	1.750	1.250	
15.000 / 18.000	4.000	-	1.500	
18.000 / 22.000	5.000	-	1.750	
22.000 / 26.000	6.000	_	2.000	





# **Universal Joint Weights at Minimum Length (pounds)**

				TYPE			
Size	Flange Dia. (Inches)	ST	SF	FT	FF With Spacer	FF Without Spacer	Tube (Inches)
RA1310	3.88	14	12	_	-	-	0.18
RA1350	4.63	25	20	_	_	_	0.22
RA1410	4.63	25	20	-	_	_	0.25
RA1480	5.88	27	22	-	_	_	0.25
RA1550	5.88	37	34	-	_	_	0.29
RA1610	6.88	45	36	-	_	_	0.90
RA1710	8	68	55	_	_	_	0.46
RA1810	8	99	83	_	_	_	0.52
RA1880	9.63	152	122	_	_	_	0.98
RA1910	9.63	166	166	_	_	_	1
DAGGE	8.86	288	214	299	252	178	1.78
RA225	9.84	296	222	345	291	194	1.78
DAOSO	8.86	362	239	426	352	259	2.22
RA250	9.84	370	247	470	391	275	2.22
RA285 9.84	9.84	474	291	579	436	335	2.67
	11.22	483	300	617	466	353	2.67
RA315	11.22	714	446	786	564	445	3.22
RASIS	12.40	729	461	842	610	475	3.22
RA350	12.40	1,000	648	1,099	801	639	3.67
RA330	13.78	1,020	668	1,172	866	679	3.67
DA200	13.78	1,354	867	1,490	1,056	882	4.22
RA390	15.35	1,383	896	1,615	1,169	940	4.22
DA 40E	15.35	1,743	1,179	1,938	1,420	1,191	6.50
RA435	17.13	1,789	1,225	2,104	1,563	1,282	6.50
RA440	17.32	-	_	2,761	1,987	1,737	10.91
RA490	19.28	-	_	3,840	2,965	2,590	11.58
RA550	21.62	_	_	5,204	3,724	3,339	14.13
RA620	24.41	_	_	6,979	5,284	4,728	16.95

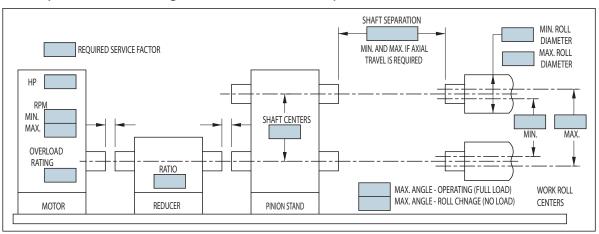
Values may vary for specific applications.

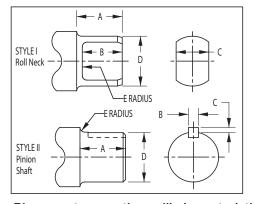
# **Rolling Mill Application Data for Selection and Design**

Name	
Company	
Phone	Fax
Date	
Inquiry Number	
Mill Type	
Number of Stands	

## **Number of Required Assemblies**

Please provide the following information in the boxes provided:





Bore Requirements				
Style	Pinion Shaft		Roll	Neck
А	Engagement Length		Engagement Length	
В	Key Width		Flat Length	
С	Key Depth		Across Flats	
D	Shaft Dia.		Neck Dia.	
Е	Radius		Radius	

### Please note any other mill characteristics such as:

- Method of Roll Change
- Operating Environment
- Restrictions on Diameter
- Drive Orientation (Vertical or Horizontal, etc.)
- Unidirectional or Reversing Drive
- Any Other Pertinent Information



# **General Application Data for Selection and Design**

Name	
Company	
Phone	Fax
Date	
Inquiry Number	
Mill Type	
Number of Stands	
Number of Required Assemblies	
Please provide the following information:	
1. Motor Horse Power	13. Drive End Shaft Configuration
2. Minimum Motor RPM	
3. Maximum Motor RPM	14. Driven End Shaft Configuration
4. Reduction Ratio	
5. Required Service Factor	15. Diameter Restrictions
6. B-10 Life Requirement	16. Operating Environment
7. Minimum Shaft Separation	
8. Maximum Shaft Separation	17. Special Equipment Interface Requirements
9. Load Offset or Angle	
10. No-load Offset or Angle	18. Other Special Conditions
11. Axial Travel Requirement	

12. Horizontal or Vertical Orientation\_\_\_\_\_

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