

KOP-FLEX®



OIL AND GAS INDUSTRY COUPLING CATALOG

REGAL®



KOP-FLEX®

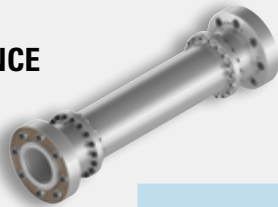
COUPLINGS

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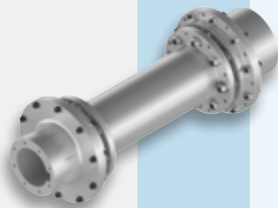
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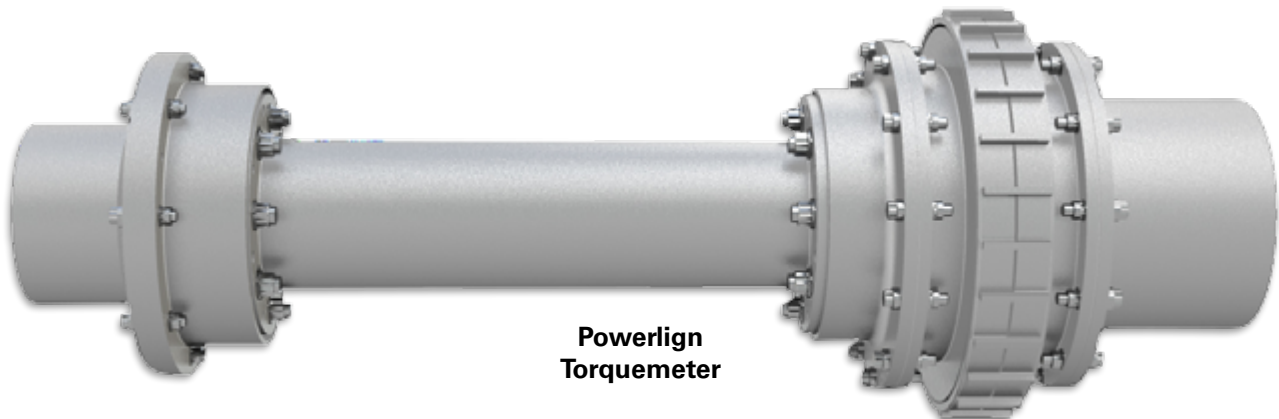


WE PROVIDE COUPLING SOLUTIONS

Smart innovation. This is the key differentiator that sets Kop-Flex high performance couplings apart. From the invention of Fast's – the world's first gear coupling – to modern-day, high performance couplings, Kop-Flex's rich industry background stands behind a reputation for creating products that solve customer problems.

Building couplings based on customer input is the core of Kop-Flex's solution-oriented design philosophy. By combining customer feedback with market trends, Kop-Flex engineers have created an entire line of coupling products that deliver high levels of performance for reliable, continuous operation.

At Kop-Flex, new product development is a core competency providing you with a significant advantage over coupling manufacturers with limited offerings. Kop-Flex offers a winning formula of new coupling products, services, support and global resources to deliver end-to-end solutions.



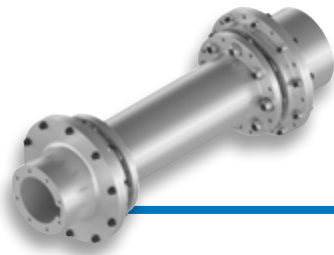
THEORY OF OPERATION

A flexible coupling must perform two tasks: (1) transmit torque from driving to driven shafts and (2) accommodate shaft misalignments. Kop-Flex high performance couplings are designed specifically to accomplish these tasks for very demanding, drive system applications such as boiler feed pumps, centrifugal and axial compressors, generator sets, test stands, marine propulsion drives and gas and steam turbines.

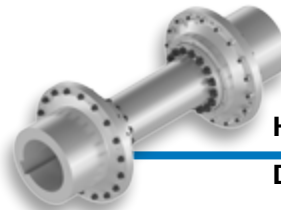
A SINGLE SOURCE FOR ALL YOUR APPLICATION NEEDS



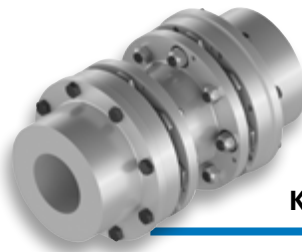
**High Performance
Disc**



KS Disc



**High Performance
Diaphragm**



KD Disc

Kop-Flex offers the broadest range of coupling products available on the market today – from high performance, high-speed disc, diaphragm and gear couplings to off-the-shelf, standard couplings as well as engineered gear, grid, jaw, elastomer, disc, universal joints and customized couplings to meet your unique application challenges. Kop-Flex also offers the Powerlign Torque Monitoring System. With a wide variety of coupling products, Kop-Flex provides a single source for all your demanding application requirements.

Kop-Flex high performance coupling products fulfill customers' needs for demanding turbomachinery applications such as steam or gas turbines and motor driven trains; compressors, generators; boiler feed pumps and special pumps for industries ranging from petrochemical, refinery, power plants, LNG, gas pipeline, test stands and more.

Kop-Flex also offers coupling products for rolling mills and casters in steel mills, paper machines (both wet and dry ends), mines, liquid handling pumps and motors (for processing or liquid handling applications) and more.



CLIENT FOCUSED, SOLUTION ORIENTED

With more customized application designs than any other coupling provider, Kop-Flex products are engineered to meet API 671 and ISO 10441, or API 610 and ISO 13409, as well as your own specifications.

In addition to delivering the most extensive line of couplings in the industry, Kop-Flex emphasizes solution-based engineering results in new, cutting edge coupling designs to help solve your most demanding application issues.

LEAN ENTERPRISE

Kop-Flex practices lean manufacturing and lean enterprise principles as part of a corporate focus on quality. Kop-Flex management champions the lean concept, which is reinforced company-wide through education and employee training. This philosophy focuses on identifying and reducing waste as part of the design and manufacturing process to improve lead time and delivery, increase productivity, enhance product quality and deliver long-term cost advantages to customers.



GLOBAL TECHNOLOGY AND SERVICE CENTERS



Kop-Flex has facilities in the U.S.A., Canada and Europe and a service centers located in Houston and Florence (U.S.A.) A state-of-art, European manufacturing and service center, based in Nove Mesto, Slovakia serves Europe, the Middle East and Asia.

The center in Slovakia meets European, Middle East and Asian requirements for Kop-Flex couplings for improved service and timely product delivery.

With global delivery operations, Kop-Flex can provide made-to-order couplings within hours or days and can satisfy urgent requirements if a customer's plant or application is down unexpectedly.

Kop-Flex also practices an extensive inspection process and can repair or refurbish any coupling – including designs produced by other manufacturers. Customer risk is further reduced with the full Kop-Flex warranty.



HIGH PERFORMANCE COUPLING RECERTIFICATION PROGRAM

Repair used equipment and save 60% to 90% the cost of buying new. It takes knowledge, experience and the proper facilities to repair a highly engineered product. Kop-Flex offers:

- Engineers and field service specialists that work with your maintenance staff to understand the unique parameters of your application
- Inspection reports detailing type of wear and/or damage and recommended action
- Exact price quotations
- Recommendations to improve life through design changes and/or material upgrades
- Highly skilled and experienced technicians

Save money and time. Kop-Flex can often inspect, report, quote, repair and ship back to you within a few weeks. Kop-Flex leads the industry in our ability to respond to your repair needs.

LET OUR EXPERTS PROVIDE YOU WITH AN ANALYSIS AND A RECOM- MENDATION

Unfortunately, no mechanical product can last forever and couplings are no exception. While Kop-Flex products are designed and built to last, many applications are so severe that rapid wear and/or coupling damage may occur.

Kop-Flex has the largest and most experienced engineering staff in the industry, with an arsenal of modern analysis tools at our disposal including FEA, an in-house R&D center and a staff focused solely on couplings. Our technical experts go beyond mere failure analysis by providing recommendations on how to help prevent future coupling problems.

KOP-FLEX SERVICE CENTERS OFFER:

- Repair and refurbishment
- Expert failure analysis
- Cost savings through consultation
- Field technical support

Kop-Flex Field Services are divided into three tiers, with trained personnel available to assist you with the following:

Technical Consultant

- Failure analysis
- Monitoring/diagnostics
- Field troubleshooting

Service Technician

- Disc pack replacement
- Coupling assembly and disassembly

Service Engineer

- Installation supervision
- Commissioning assistance
- Application review
- Balance and alignment review
- Survey/asset optimization
- Powerlign® troubleshooting



High performance
coupling for
refurbishment

DISC, DIAPHRAGM, AND GEAR

HIGH PERFORMANCE COUPLING INSPECTION AND REPAIR PROCESS

Kop-Flex provides the most extensive evaluation, inspection and repair service in the industry:

- Each component is photographed as received for thorough engineering inspection
- Couplings are disassembled and all components are tagged
- Non-destructive test on torque carrying components is conducted using Magnetic Particle Inspection (MPI), Dye Penetrant and X-ray as required
- Kop-Flex engineers analyze the data and prepare an inspection report detailing findings and offer their expert recommendation on how to refurbish, repair or replace based on the amount of wear and damage
- A quotation for performing the work recommended is submitted back to you within two weeks of receiving your coupling in our facility
- Couplings will be assembled to original specifications, skimmed at assembly, dynamically balanced to API 671 (ISO 10441) or API610 (ISO 13709) – component or assembly – as required by the application and your specifications
- Quick Turnaround - our complete inventory of flex elements and nitrided gear components speeds the process

Once we receive your approval and purchase order, we will immediately refurbish or replace parts as required. With our worldwide facilities, we can provide prompt service to any of your operations.



Avoiding Downtime is Critical in High Performance Environments

Kop-Flex can help you recognize significant savings in the following applications:

- Petrochemical plants
- Offshore drilling rigs
- Turbomachinery
- Gas/steam, turbine-driven compressor drive trains
- Synchronous motor drives
- Boiler feed pumps
- Generator drives in fossil fuel and nuclear power plants

Kop-Flex is the industry authority in turbomachinery with strong technical representation on API and ISO committees, as well as active participation in many technical forums. Kop-Flex experts will provide you with objective failure analysis, inspections and reports.

Kop-Flex will repair or refurbish any coupling including those manufactured by our competitors and provide you with a warranty and a proactive plan to reduce costs. Our process of inspecting and repairing high performance couplings is the most extensive in the industry.

KOP-FLEX COUPLINGS FOR API 671 AND ISO 10441 APPLICATIONS



HP DISC 2.0 SERIES

Lightest weight reduced moment coupling available, maximizes equipment performance on highly engineering, high speed equipment. Typically used to drive gearboxes and compressors.



HP DIAPHRAGM

High Performance API 671 and ISO 10441 couplings frequently used on critical Gas Turbine driven trains. Typically used to drive gearboxes, compressors and generators.



HP DISC 1.0 SERIES

High Performance API 671 and ISO 10441 couplings for motor and turbine driven critical applications. Typically used to drive gearboxes, compressors and generators.



KS SERIES

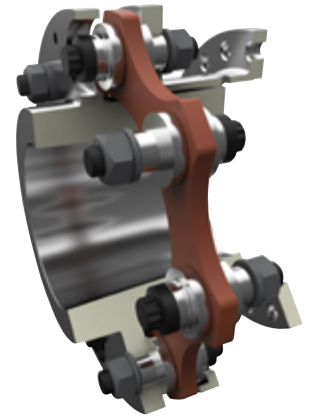
Turbine or motor drives in the intermediate speed range requiring a cost effective API 671 and ISO 10441 solution. Typically used to drive pumps, gearboxes, compressors and generators.

	KS	HP Disc 1.0	HP Diaphragm	HP Disc 2.0
STANDARD MATERIAL	Carbon Steel	4140/4340 Alloy (Ti optional)	4140/4340 Alloy (Ti optional)	4340 Alloy (Ti optional)
FLEX ELEMENT AND GEOMETRY	AISI 301 Stainless Scalloped	AISI 301 Stainless Scalloped	15-5 Stainless custom designed for each application	AISI 301 Stainless <i>Optimized</i> Scallops
FLEX ELEMENT COATING	Optional	Koplon standard	Single corrosive resistant flex element	Koplon standard
TORQUE & SPEED CAPACITY	Good	Greater	Greater Can be tuned per application	Greatest
RUNOUT & TRUE POSITION	API 671 Minimum	Meets or Exceeds API 671 Requirements	Meets or Exceeds API 671 Requirements	Meets or Exceeds API 671 Requirements
INTERLOCKING FEATURE	N/A	Yes, with MS	Yes, back up gearing optional	Yes, with RMS
SURFACE FINISH	API 671 Minimum	Meets or Exceeds API 671 Requirements	Meets or Exceeds API 671 Requirements	Meets or Exceeds API 671 Requirements



INTRODUCING HIGH PERFORMANCE DISC 2.0

Kop-Flex high performance couplings have been supplied to the global oil and gas industry for over 30 years and have amassed over one billion hours of reliable operation in API 671 applications. Leveraging this experience, the next generation of disc coupling was developed to enable continued improvements in the turbomachinery equipment. Gas turbines and compressors are being designed for increased efficiency by leveraging smaller form factors and higher speeds, creating rotordynamic challenges. To achieve the best weight and power density possible, a more compact coupling was designed and optimized for the torque requirements of the application. Building on our foundation of reliability, safety and exceptional performance, the Kop-Flex High Performance Disc Coupling 2.0 was created for your highly engineered equipment.



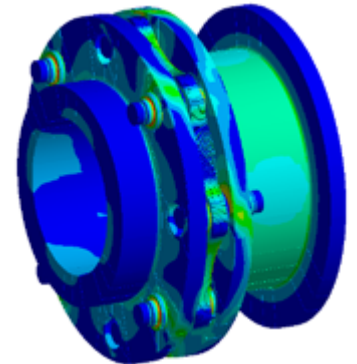
ADVANTAGES

- Optimized disc geometry improves stress distribution and reduces reaction loads
- 15-30% weight reduction compared to our previous generation coupling
- Lowest overhung moment available
- Reduced coupling diameter decreases windage effects
- 22 sizes available to align with common inch and metric shafts
- Weight reduction decreases imbalance forces on equipment

The next generation Kop-Flex disc coupling is an evolutionary design developed using cutting edge analysis tools and techniques, including:

- Advanced finite element analysis
- In-house static and dynamic testing
- Fatigue life testing

Development leveraged our in-house R&D facility, which includes state-of-the-art test stands and precision instrumentation specifically designed for the development of next generation coupling products. Analysis and testing complexity ranged from individual components to complete couplings to determine the product ratings met requirements. These improved analysis techniques enable technical details and in-depth analysis of application specific designs to be delivered quickly and confidently.



PRODUCT LINE OVERVIEW

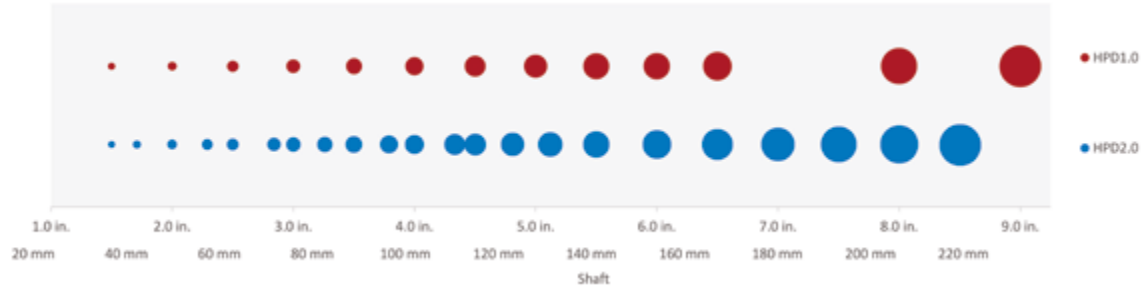
The High Performance Disc Coupling 2.0 product line consists of two reduced moment styles: the RMS and RZS. The RMS is a full featured disc coupling providing a reduced windage design and interlocking flanges for additional protection in the event of a disc pack failure. The RZS coupling provides a more cost effective solution, with non-interlocking flanges. Optional coupling features also include:

- Powerlign® torquemeter
- Lateral and torsional tuning
- Electrical insulation
- Shear device
- Corrosion resistant material



OPTIMIZED COUPLING SELECTION

Shaft diameter drives the selection of reduced moment couplings for most high speed equipment. The product line was designed with 22 sizes to match the most common inch and metric shafts, providing an optimized coupling selection for each application. The Kop-Flex High Performance Disc Coupling 2.0 is designed to be the lightest coupling available on the market, enabling the highest performance in critical applications.



SELECTION EXAMPLE

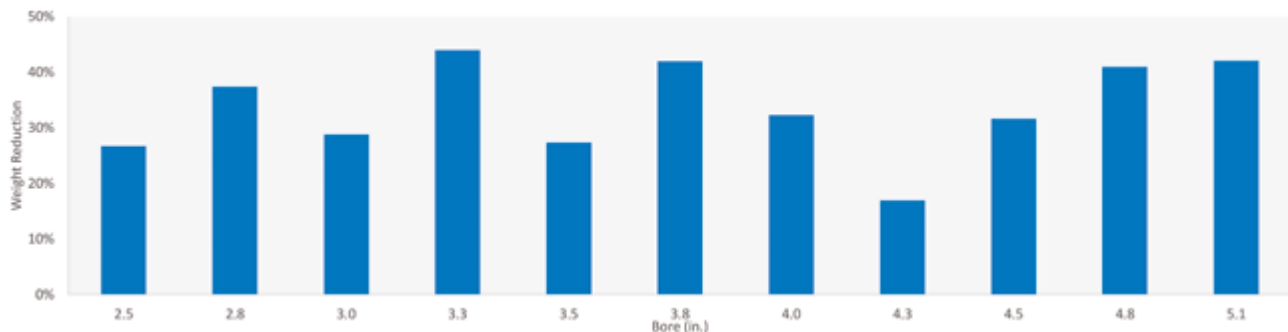
Compressor train for top oil and gas producer's offshore project:

Application Info		
Equipment	Gearbox to Compressor	
Driver Rated Torque - lb-in (N-m)	28,000 (3,164)	
Max Continuous Speed (rpm)	13,000	
Coupling Details	Previous Generation	Disc Coupling 2.0
Spacer Material	Titanium	Alloy Steel
Max OD - in. (mm)	6.56 (166)	5.86 (149)
Driving Half Weight - lb (kg)	17.1 (7.76)	14.6 (6.62)
Driven Half Weight - lb (kg)	17.1 (7.76)	14.6 (6.62)

The Kop-Flex High Performance Disc Coupling 2.0 selection enabled the customer to use a more cost-effective alloy steel spacer while still achieving a 15% weight reduction and meeting all application requirements.

LIGHTEST WEIGHT COUPLING

Average weight reduction of over 30% compared to the previous generation.



API 671 AND ISO 10441 SELECTION PROCEDURE

1. Select the coupling style and the appropriate service factor as listed below. The coupling selection should have a maximum, continuous rating that will accommodate the service factor and the normal continuous torque.

Note: To account for off-design fluctuating or continuous torques, a service factor should be used. API 671 recommends 1.5; Kop-Flex also recommends 1.5 minimum for general turbomachinery applications.

SERVICE FACTORS

Generally constant torque with off-design conditions (turbines, centrifugal compressors, gearboxes)	1.50
API 671	1.50
Moderate torque fluctuations (large fans, screw compressors, etc.)	2.00

2. Check the maximum momentary torque capacity of the coupling selected. (Consult Kop-Flex for synchronous motor applications.)
3. Check the maximum bore capacity and the maximum momentary torque rating of the coupling selected.
4. Check the axial and angular misalignment requirements of the application (thermal growth, etc.)
5. Check that the coupling will not interfere with the coupling guard, piping, or the equipment housing and that it will fit in the shaft separation required.

Coupling selection, windage data, and lateral critical speeds can be supplied by Kop-Flex if necessary.

EXAMPLE 1:

GAS TURBINE/SPEED REDUCER

Normal load: 5000 HP at 5000 RPM
 (1.5 service factor, reduced moment required; interlocking flanges not required)
 Turbine shaft = 3 in. tapered, keyless hydraulic
 Gearbox shaft = 3 in. tapered, keyed
 18" shaft separation
 Continuous torque capacity required (lb-in.)
 $(HP \times 63025 / RPM) \times SF = 94540 \text{ lb-in.}$

SELECTION:

#254 RZ Reduced Moment Style

EXAMPLE 2:

GAS TURBINE/CENTRIFUGAL COMPRESOR

38,500 HP (28,700 kW) at 4600 rpm
 Turbine shaft = 5 in. (127 mm) - tapered, keyless hydraulic
 Compressor shaft = 5 in. (127 mm) - tapered keyless hydraulic
 AP1 671 service factor required (1.50)
 Angular misalignment capacity required = 0.25°
 Compressor is sensitive to overhung weight
 $(HP \times 63025 / RPM) SF = 791,240 \text{ lb-in}$

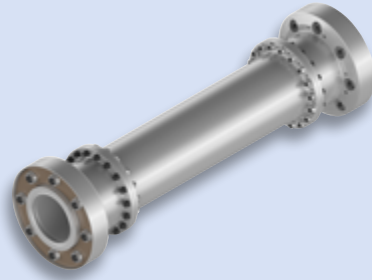
SELECTION:

Size #4.0 MSH/#5.5 RMM
 Marine style (MS) coupling on turbine end and reduced moment (RM) on the compressor end.

HIGH PERFORMANCE DISC COUPLINGS

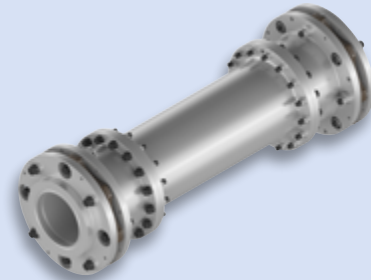
HPD2.0
Reduced Moment

**INTERLOCKING
DESIGN**



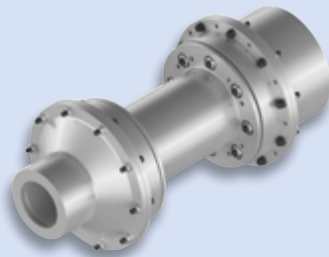
RMS STYLE

**NON
INTERLOCKING**

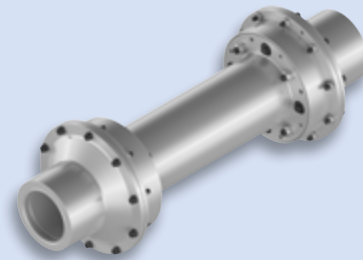


RZS STYLE

HPD1.0
Marine Style

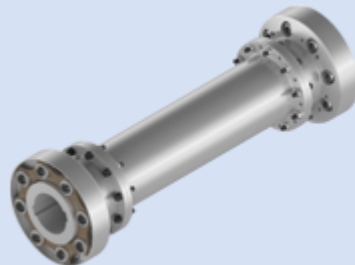


MS STYLE

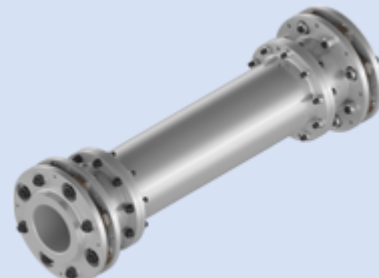


MP STYLE

HPD1.0
Reduced Moment



RM STYLE



RZS STYLE

HIGH PERFORMANCE FLEXIBLE DISC COUPLINGS

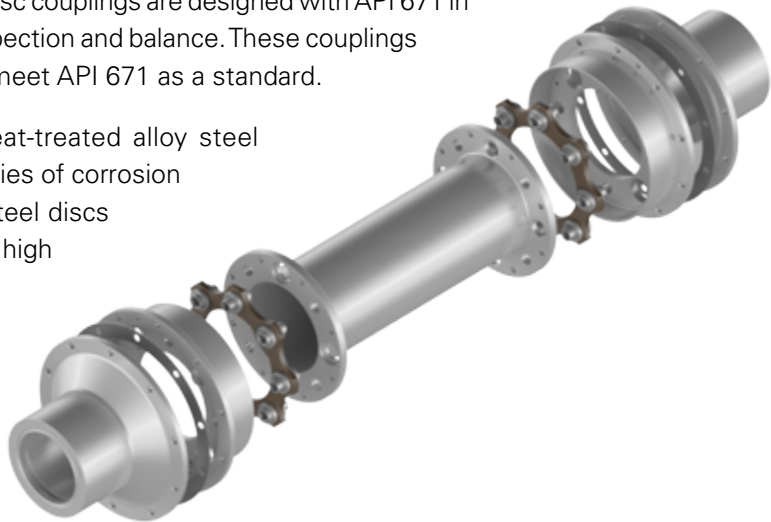
COUPLING DESIGN IS THE KEY

The innovative Kop-Flex high performance disc coupling design provides a highly reliable, rotating machinery connection. Factory assembly of the disc packs ensures optimum quality and performance and keeps installation time to a minimum.

Further, Kop-Flex high performance disc couplings are designed with API 671 in mind for fit, tolerance, materials, inspection and balance. These couplings are designed and manufactured to meet API 671 as a standard.

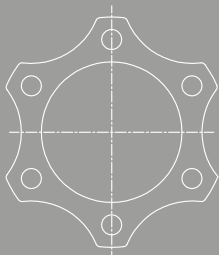
Hubs, sleeves and spacers are heat-treated alloy steel while the flexible elements are a series of corrosion resistant, high strength, stainless steel discs coated with Koplon. Accessories are high quality steel fasteners.

As a result of factory assembly, interference fit pilots and tight fitting bolts, the couplings retain their balance integrity even after repeated reassembly.

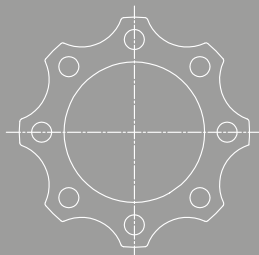


The flexible disc pack is available in 3, 4, 5 and 6-bolt designs to meet various torque and misalignment conditions. The 3-bolt design allows for the most axial and angular misalignment due to the increased flexibility of longer disc links between each bolt.

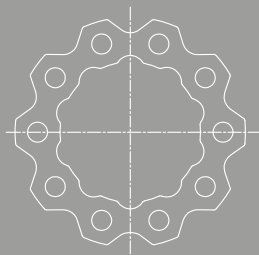
Where high torque capacity is required with smaller angular and axial misalignments, such as between a motor and generator subject to short circuit torques, 5 or 6-bolt designs can be used.



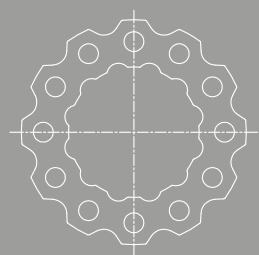
3-Bolt



4-Bolt



5-Bolt



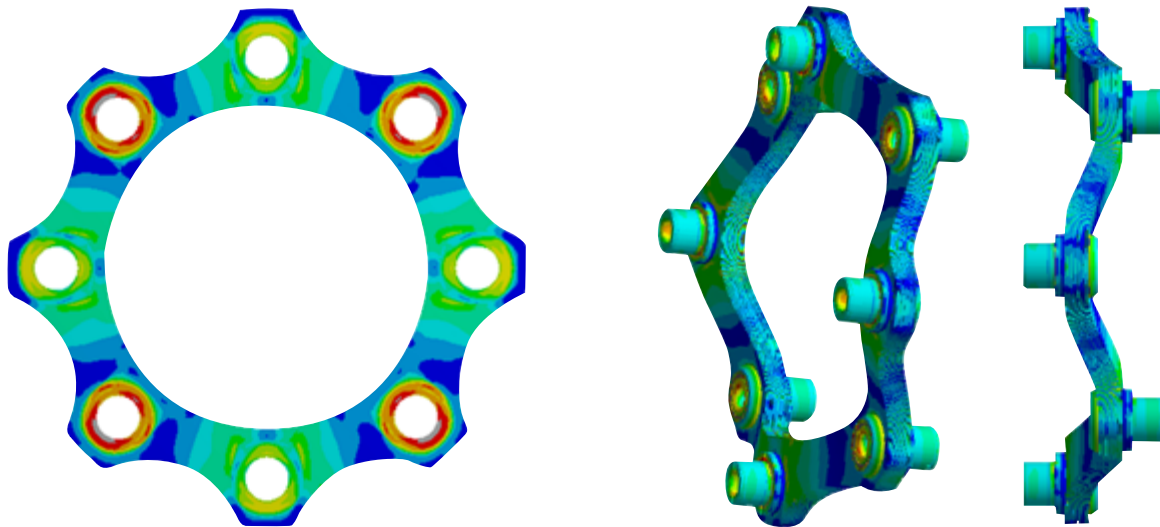
6-Bolt

Note: The last digit in a coupling's size designation determines whether it is a 3, 4, 5 or 6-bolt design. For example a size 153 coupling is a 3-bolt design.

KOP-FLEX

DISC ADVANTAGES

The disc pack is the heart of the Kop-Flex High Performance coupling and transmits torque while accommodating axial, offset and angular misalignment. A series of precision manufactured discs assembled with washers and bushings are assembled into a unitized pack. The disc material is special, high strength, AISI 301 stainless steel and each disc is Koplone coated to help prevent fretting corrosion. Alternate disc materials, such as Inconel, are available; consult Kop-Flex.



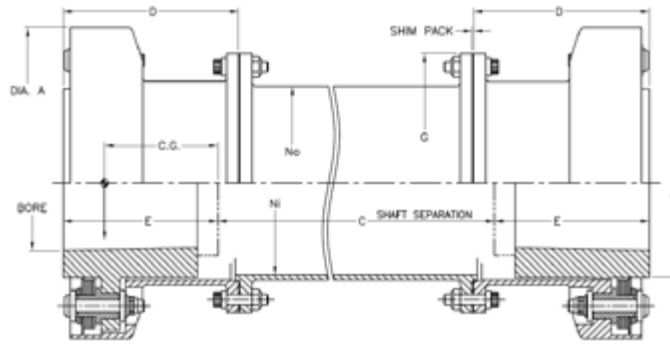
The discs have a scalloped link design. This results in increased flexibility and subsequent lower reaction forces on the connected equipment bearings. Further, stress distribution is uniform, which allows for increased misalignment capability and lower fatigue stresses on the discs. The scalloping also reduces weight and inertia.

The discs are designed for infinite life with a factor of safety. Under loading, the disc pack is exposed to constant stresses due to torque, speed, and axial misalignment, and to alternating stresses due to angular and offset misalignment.

The combined effect of these stresses is plotted on a modified Goodman diagram, which gives the disc material endurance limit boundaries.

- Lower reaction forces
- AISI 301 stainless steel
- Koplone coating
- Uniform stress distribution
- Reduced weight and inertia
- Unitized assembly

RMS DISC COUPLING



RMS COUPLING SELECTION DATA

Size	① Nominal Bore Capacity (in)	④ Maximum Continuous Torque Rating (lb-in)	⑤ Maximum Momentary Torque Rating (lb-in)	Maximum Speed (rpm)	⑥ Total Weight (lb)	⑥ Total WR ² (lb-in ²)	⑥ Half Coupling C.G. (in)	⑥ Torsional Stiffness k (E6 lb-in/rad)
2103	1.6	12000	19000	34300	13	25	1.6	0.4
2504	1.7	22000	35000	33000	17	45	1.7	0.5
3004	2.0	30000	48000	30800	19	55	1.8	0.7
3304	2.3	39000	62000	29400	22	75	2.0	0.9
3604	2.5	53000	85000	26700	27	110	2.3	1.3
4104	2.8	76000	121000	23700	34	180	2.6	1.7
4304	3.0	90000	144000	22500	39	230	2.7	2.1
4704	3.3	115000	184000	20700	48	330	2.8	2.8
5104	3.5	147000	235000	19100	62	500	3.0	3.5
5504	3.8	180000	288000	17800	74	680	3.3	4.6
5804	4.0	215000	344000	16800	88	910	3.4	5.4
6204	4.3	268000	428000	15600	106	1300	3.7	7.1
6504	4.5	301000	481000	15000	120	1600	3.8	8.3
6904	4.8	367000	587000	14100	145	2100	4.0	10
7404	5.1	425000	680000	13200	170	2900	4.4	13
7904	5.5	527000	843000	12300	218	4300	4.6	16
8604	6.0	670000	1070000	11300	272	6400	4.9	21
9404	6.5	842000	1350000	10400	341	9300	5.6	28
10104	7.0	1020000	1630000	9700	434	14000	5.9	35
10804	7.5	1270000	2030000	9000	524	19000	6.2	45
11604	8.0	1550000	2480000	8400	655	28000	6.6	55
12404	8.6	1880000	3010000	7900	779	37000	7.0	69

RMS DIMENSIONAL DATA

Size	A	D	G	No	Ni	② E Typical	MAXIMUM O	③ MINIMUM C
2103	4.06	4.02	3.69	2.16	1.91	1.98	2.25	7.8
2504	4.73	4.07	4.06	2.51	2.27	2.09	2.40	7.8
3004	5.07	4.08	4.33	2.91	2.67	2.38	2.80	7.8
3304	5.32	4.16	4.80	3.32	3.08	2.67	3.21	7.8
3604	5.86	4.19	5.13	3.66	3.42	2.97	3.54	7.8
4104	6.58	4.36	5.54	4.10	3.86	3.34	3.98	7.8
4304	6.95	4.48	5.80	4.33	4.09	3.51	4.21	7.8
4704	7.55	4.54	6.29	4.69	4.45	3.76	4.57	7.8
5104	8.19	5.07	6.88	5.09	4.83	4.04	4.96	7.8
5504	8.77	5.70	7.30	5.45	5.17	4.36	5.31	7.8
5804	9.30	5.90	7.74	5.78	5.48	4.58	5.63	7.8
6204	10.01	6.36	8.34	6.22	5.90	4.95	6.06	8.2
6504	10.40	6.48	8.67	6.47	6.13	5.13	6.30	8.3
6904	11.11	6.66	9.26	6.91	6.55	5.43	6.73	8.4
7404	11.84	7.12	9.86	7.36	6.98	5.87	7.17	8.8
7904	12.75	7.49	10.72	7.93	7.51	6.26	7.72	9.2
8604	13.85	8.27	11.54	8.59	8.15	6.74	8.39	10.2
9404	15.01	8.99	12.50	9.33	8.85	7.49	9.09	10.9
10104	16.18	9.45	13.60	10.06	9.54	8.00	9.80	11.3
10804	17.35	10.06	14.50	10.79	10.23	8.51	10.51	12.1
11604	18.59	10.90	15.75	11.56	10.96	9.04	11.26	13.2
12404	19.83	11.76	16.65	12.33	11.69	9.58	12.01	14.5

① Based on 1.4 hub O.D./ bore ratio; larger bores are possible, consult Kop-Flex for specific applications.

② Hub Length includes nominal retaining nut width. It can be reduced for smaller bores with shorter fit lengths.

③ Minimum shaft separation for typical fit lengths (E) and installation without disturbing connected equipment. Shorter shaft separations are possible, contact Kop-Flex for more details

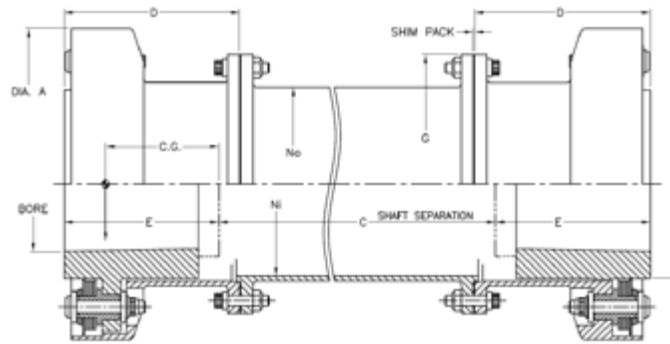
④ API 671 rating (0.2 degrees misalignment with full axial misalignment capacity).

⑤ Maximum momentary torque rating as defined by API 671 is used to evaluate events such as a generator short circuit. Other non-continuous/dynamic events, such as synchronous motor start-ups, are evaluated independently. For dynamic events, mean and alternating torques and required number of cycles must be provided to complete a fatigue analysis.

⑥ Based on coupling with 18 inch shaft separation and nominal tapered bores for keyless hydraulic shaft connections. Mass elastic data can be optimized to meet specific requirements.

Specifications and selection data are subject to change without notice.

RMS DISC COUPLING (METRIC)



RMS COUPLING SELECTION DATA

Size	① Nominal Bore Capacity (mm)	④ Maximum Continuous Torque Rating (N-m)	⑤ Maximum Momentary Torque Rating (N-m)	Maximum Speed (rpm)	⑥ Total Weight (kg)	⑥ Total WR ² (kg-m ²)	⑥ Half Coupling C.G. (mm)	⑥ Torsional Stiffness k (MN-m/rad)
2103	41	1360	2150	34300	6	0.01	40	0.04
2504	43	2490	3960	33000	8	0.01	43	0.05
3004	51	3390	5420	30800	9	0.02	46	0.08
3304	58	4410	7010	29400	10	0.02	52	0.10
3604	64	5990	9610	26700	12	0.03	58	0.15
4104	72	8590	13700	23700	16	0.05	65	0.19
4304	76	10200	16300	22500	18	0.07	68	0.24
4704	83	13000	20800	20700	22	0.10	72	0.32
5104	90	16600	26600	19100	28	0.15	77	0.40
5504	96	20300	32500	17800	34	0.20	83	0.52
5804	102	24300	38900	16800	40	0.27	87	0.61
6204	110	30300	48400	15600	48	0.38	94	0.80
6504	114	34000	54400	15000	54	0.47	97	0.94
6904	122	41500	66300	14100	66	0.62	102	1.1
7404	130	48000	76800	13200	77	0.85	111	1.4
7904	140	59600	95300	12300	99	1.3	118	1.8
8604	152	75700	121000	11300	123	1.9	125	2.4
9404	165	95100	152500	10400	155	2.7	141	3.2
10104	178	115500	184000	9700	197	4.1	149	4.0
10804	191	143500	229500	9000	238	5.6	158	5.1
11604	204	175000	280000	8400	297	8.2	167	6.2
12404	218	212500	340000	7900	353	10.8	177	7.8

RMS DIMENSIONAL DATA

Size	A	D	G	No	Ni	② E Typical	MAXIMUM O	③ MINIMUM C
2103	103	102	94	55	49	50	57	198
2504	120	103	103	64	58	53	61	198
3004	129	104	110	74	68	60	71	198
3304	135	106	122	84	78	68	82	198
3604	149	106	130	93	87	75	90	198
4104	167	111	141	104	98	85	101	198
4304	177	114	147	110	104	89	107	198
4704	192	115	160	119	113	96	116	198
5104	208	129	175	129	123	103	126	198
5504	223	145	185	138	131	111	135	198
5804	236	150	197	147	139	116	143	198
6204	254	162	212	158	150	126	154	208
6504	264	165	220	164	156	130	160	211
6904	282	169	235	176	166	138	171	213
7404	301	181	250	187	177	149	182	224
7904	324	190	272	201	191	159	196	234
8604	352	210	293	218	207	171	213	259
9404	381	228	318	237	225	190	231	277
10104	411	240	345	256	242	203	249	287
10804	441	256	368	274	260	216	267	307
11604	472	277	400	294	278	230	286	335
12404	504	299	423	313	297	243	305	368

① Based on 1.4 hub O.D./ bore ratio; larger bores are possible, consult Kop-Flex for specific applications.

② Hub Length includes nominal retaining nut width. It can be reduced for smaller bores with shorter fit lengths.

③ Minimum shaft separation for typical fit lengths (E) and installation without disturbing connected equipment. Shorter shaft separations are possible, contact Kop-Flex for more details

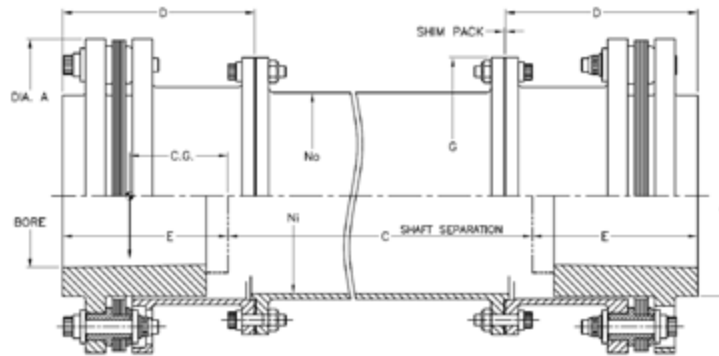
④ API 671 rating (0.2 degrees misalignment with full axial misalignment capacity).

⑤ Maximum momentary torque rating as defined by API 671 is used to evaluate events such as a generator short circuit. Other non-continuous/dynamic events, such as synchronous motor start-ups, are evaluated independently. For dynamic events, mean and alternating torques and required number of cycles must be provided to complete a fatigue analysis.

⑥ Based on coupling with 457 mm shaft separation and nominal tapered bores for keyless hydraulic shaft connections. Mass elastic data can be optimized to meet specific requirements.

Specifications and selection data are subject to change without notice.

RZS DISC COUPLING



RZS COUPLING SELECTION DATA

Size	① Nominal Bore Capacity (in)	④ Maximum Continuous Torque Rating (lb-in)	⑤ Maximum Momentary Torque Rating (lb-in)	Maximum Speed (rpm)	⑥ Total Weight (lb)	⑥ Total WR ² (lb-in ²)	⑥ Half Coupling C.G. (in)	⑥ Torsional Stiffness K (E6 lb-in/rad)
2103	1.5	12000	19000	34300	12	20	1.1	0.4
2504	1.7	22000	35000	33000	15	35	1.2	0.5
3004	2.0	30000	48000	30800	17	45	1.5	0.7
3304	2.3	39000	62000	29400	21	70	1.7	0.9
3604	2.5	53000	85000	26700	26	100	1.9	1.3
4104	2.8	76000	121000	23700	34	160	2.2	1.7
4304	3.0	90000	144000	22500	38	210	2.3	2.2
4704	3.3	115000	184000	20700	46	290	2.4	2.9
5104	3.5	147000	235000	19100	60	450	2.6	3.7
5504	3.8	180000	288000	17800	71	630	2.8	4.8
5804	4.0	215000	344000	16800	85	830	3.0	5.6
6204	4.3	268000	428000	15600	103	1200	3.2	7.4
6504	4.5	301000	481000	15000	119	1500	3.4	8.7
6904	4.8	367000	587000	14100	140	2000	3.5	11
7404	5.1	425000	680000	13200	165	2600	3.8	13
7904	5.5	527000	843000	12300	214	4000	4.1	17
8604	6.0	670000	1070000	11300	265	5800	4.3	22
9404	6.5	842000	1350000	10400	331	8500	4.9	30
10104	7.0	1020000	1630000	9700	419	13000	5.2	36
10804	7.5	1270000	2030000	9000	508	18000	5.5	47
11604	8.0	1550000	2480000	8400	635	25000	5.8	57
12404	8.6	1880000	3010000	7900	748	34000	6.1	73

RZS DIMENSIONAL DATA

Size	A	D	G	No	Ni	② E Typical	MAX O	③ MIN C
2103	3.88	4.47	3.69	2.25	2.00	1.89	2.12	8.8
2504	4.51	4.64	4.06	2.51	2.27	2.09	2.40	8.8
3004	4.82	4.54	4.33	2.91	2.67	2.38	2.80	8.8
3304	5.10	4.64	4.80	3.32	3.08	2.67	3.21	8.8
3604	5.58	4.69	5.13	3.66	3.42	2.97	3.54	8.8
4104	6.35	4.93	5.54	4.10	3.86	3.34	3.98	8.8
4304	6.67	5.06	5.80	4.33	4.09	3.51	4.21	8.8
4704	7.17	5.13	6.29	4.69	4.45	3.76	4.57	8.8
5104	7.77	5.74	6.88	5.09	4.83	4.04	4.96	8.8
5504	8.45	6.39	7.30	5.45	5.17	4.36	5.31	8.8
5804	8.88	6.58	7.74	5.78	5.48	4.58	5.63	9.0
6204	9.59	7.07	8.34	6.22	5.90	4.95	6.06	9.6
6504	10.08	7.20	8.67	6.47	6.13	5.13	6.30	9.7
6904	10.65	7.45	9.26	6.91	6.55	5.43	6.73	9.9
7404	11.28	7.93	9.86	7.36	6.98	5.87	7.17	10.4
7904	12.20	8.42	10.72	7.93	7.51	6.26	7.72	11.0
8604	13.22	9.28	11.54	8.59	8.15	6.74	8.39	12.2
9404	14.36	10.03	12.50	9.33	8.85	7.49	9.09	13.0
10104	15.34	10.57	13.60	10.06	9.54	8.00	9.80	13.6
10804	16.65	11.23	14.50	10.79	10.23	8.51	10.51	14.5
11604	17.75	12.24	15.75	11.56	10.96	9.04	11.26	15.9
12404	18.82	13.12	16.65	12.33	11.69	9.58	12.01	17.3

① Based on 1.4 hub O.D./ bore ratio; larger bores are possible, consult Kop-Flex for specific applications.

② Hub Length includes nominal retaining nut width. It can be reduced for smaller bores with shorter fit lengths.

③ Minimum shaft separation for typical fit lengths (E) and installation without disturbing connected equipment. Shorter shaft separations are possible, contact Kop-Flex for more details

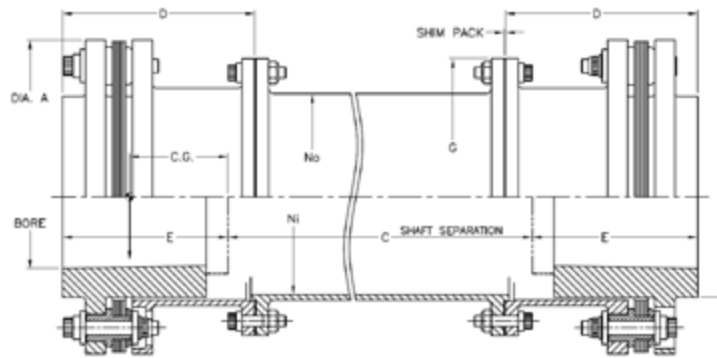
④ API 671 rating (0.2 degrees misalignment with full axial misalignment capacity).

⑤ Maximum momentary torque rating as defined by API 671 is used to evaluate events such as a generator short circuit. Other non-continuous/dynamic events, such as synchronous motor start-ups, are evaluated independently. For dynamic events, mean and alternating torques and required number of cycles must be provided to complete a fatigue analysis.

⑥ Based on coupling with 18 inch shaft separation and nominal tapered bores for keyless hydraulic shaft connections. Mass elastic data can be optimized to meet specific requirements.

Specifications and selection data are subject to change without notice.

RZS DISC COUPLING (METRIC)



RZS COUPLING SELECTION DATA

Size	① Nominal Bore Capacity (mm)	④ Maximum Continuous Torque Rating (N-m)	⑤ Maximum Momentary Torque Rating (N-m)	Maximum Speed (rpm)	⑥ Total Weight (kg)	⑥ Total WR ² (kg-m ²)	⑥ Half Coupling C.G. (mm)	⑥ Torsional Stiffness k (MN-/rad)
2103	38	1360	2150	34300	5	0.01	28	0.04
2504	43	2490	3960	33000	7	0.01	30	0.06
3004	51	3390	5420	30800	8	0.01	37	0.08
3304	58	4410	7010	29400	10	0.02	42	0.11
3604	64	5990	9610	26700	12	0.03	49	0.15
4104	72	8590	13700	23700	15	0.05	55	0.19
4304	76	10200	16300	22500	17	0.06	57	0.25
4704	83	13000	20800	20700	21	0.09	62	0.33
5104	90	16600	26600	19100	27	0.13	65	0.42
5504	96	20300	32500	17800	32	0.19	71	0.54
5804	102	24300	38900	16800	39	0.24	75	0.63
6204	110	30300	48400	15600	47	0.35	82	0.84
6504	114	34000	54400	15000	54	0.44	85	1.0
6904	122	41500	66300	14100	64	0.59	89	1.2
7404	130	48000	76800	13200	75	0.76	98	1.5
7904	140	59600	95300	12300	97	1.2	103	1.9
8604	152	75700	121000	11300	120	1.7	110	2.5
9404	165	95100	152500	10400	150	2.5	125	3.4
10104	178	115500	184000	9700	190	3.8	131	4.1
10804	191	143500	229500	9000	230	5.3	140	5.3
11604	204	175000	280000	8400	290	7.3	147	6.4
12404	218	212500	340000	7900	340	10.0	156	8.2

RZS DIMENSIONAL DATA

Size	A	D	G	No	Ni	② E Typical	MAXIMUM O	③ MINIMUM C
2103	99	114	94	57	51	48	54	224
2504	115	118	103	64	58	53	61	224
3004	122	115	110	74	68	60	71	224
3304	130	118	122	84	78	68	82	224
3604	142	119	130	93	87	75	90	224
4104	161	125	141	104	98	85	101	224
4304	169	129	147	110	104	89	107	224
4704	182	130	160	119	113	96	116	224
5104	197	146	175	129	123	103	126	224
5504	215	162	185	138	131	111	135	224
5804	226	167	197	147	139	116	143	229
6204	244	180	212	158	150	126	154	244
6504	256	183	220	164	156	130	160	246
6904	271	189	235	176	166	138	171	251
7404	287	201	250	187	177	149	182	264
7904	310	214	272	201	191	159	196	279
8604	336	236	293	218	207	171	213	310
9404	365	255	318	237	225	190	231	330
10104	390	268	345	256	242	203	249	345
10804	423	285	368	274	260	216	267	368
11604	451	311	400	294	278	230	286	404
12404	478	333	423	313	297	243	305	439

① Based on 1.4 hub O.D./ bore ratio; larger bores are possible, consult Kop-Flex for specific applications.

② Hub Length includes nominal retaining nut width. It can be reduced for smaller bores with shorter fit lengths.

③ Minimum shaft separation for typical fit lengths (E) and installation without disturbing connected equipment. Shorter shaft separations are possible, contact Kop-Flex for more details

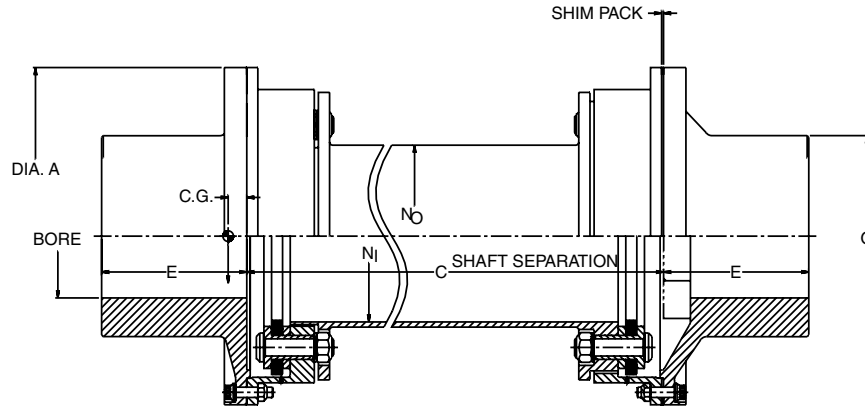
④ API 671 rating (0.2 degrees misalignment with full axial misalignment capacity).

⑤ Maximum momentary torque rating as defined by API 671 is used to evaluate events such as a generator short circuit. Other non-continuous/dynamic events, such as synchronous motor start-ups, are evaluated independently. For dynamic events, mean and alternating torques and required number of cycles must be provided to complete a fatigue analysis.

⑥ Based on coupling with 457 mm shaft separation and nominal tapered bores for keyless hydraulic shaft connections. Mass elastic data can be optimized to meet specific requirements.

Specifications and selection data are subject to change without notice.

MS DISC COUPLING



MS COUPLING SELECTION DATA

SIZE	① MAX. BORE CAPACITY (in)	② MAX. CONTINUOUS COUPLING RATING HP/100 RPM	③ MAX. CONTINUOUS TORQUE RATING (in-lbs)	④ MAX. MOMENTARY TORQUE RATING (in-lbs)	MAX. SPEED RPM	⑤ TOTAL WEIGHT (lbs)	⑥ TOTAL WR ² (lb-in ²)	⑦ HALF COUPLING C.G. (in)	⑧ TORSIONAL STIFFNESS K (E6 lb-in/rad)	SPACER TUBE/IN		
										K (E6 lb-in/rad)	WEIGHT (lbs)	WR ² (lb-in ²)
103	2.5	19	12000	19000	27700	18.8	52	0.13	0.52	12.1	0.21	0.29
153	3.5	48	30000	48000	23100	32.9	150	0.18	1.4	41.5	0.38	0.99
154	3.5	72	47000	75000	23100	34.7	134	0.18	1.7	41.5	0.38	0.99
203	4.0	88	56000	89000	20200	47.2	291	0.36	2.4	71.3	0.43	1.71
204	4.0	132	83000	132000	20200	47.5	293	0.36	2.6	71.3	0.43	1.71
253	5.0	135	85000	135000	16900	75.3	669	0.41	4.3	129	0.55	3.10
254	5.0	210	132000	210000	16900	76.2	678	0.41	4.8	129	0.55	3.10
303	6.0	219	138000	219000	14800	110	678	0.46	8.0	252	0.77	6.04
304	6.0	331	209000	332000	14800	112	1310	0.45	8.9	252	0.77	6.04
353	6.5	343	216000	343000	12800	164	2590	0.44	13	458	1.06	11.0
354	6.5	517	326000	518000	12800	167	2620	0.42	15	458	1.06	11.0
355	6.5	647	407000	647000	12800	166	2570	0.37	15	536	1.25	12.8
403	7.5	501	315000	501000	11300	235	4810	0.40	19	769	1.41	18.4
404	7.5	750	473000	752000	11300	238	4800	0.39	23	769	1.41	18.4
405	7.5	938	591000	940000	11300	235	4720	0.34	28	769	1.40	18.4
453	8.5	660	416000	661000	10100	317	7960	0.58	27	1190	1.78	28.5
454	8.5	1020	642000	1021000	10100	322	8080	0.56	33	1190	1.78	28.5
455	8.5	1270	801000	1274000	10100	336	8450	0.47	22	1190	1.80	28.5
504	9.0	1290	813000	1293000	9400	399	11600	0.76	37	1560	1.94	37.2
505	9.0	1610	1016000	1615000	9400	407	11500	0.71	41	1560	1.94	37.2
554	10.0	1720	1082000	1720000	8400	552	20200	0.66	49	2250	2.37	53.9
555	10.0	2150	1354000	2153000	8400	564	20100	0.61	54	2250	2.37	53.9
604	11.0	2190	1379000	2193000	7900	668	28000	0.83	72	3160	2.84	75.6
605	11.0	2730	1742000	2741000	7900	683	27900	0.78	77	3160	2.84	75.6

MS DIMENSIONAL DATA

SIZE	A	No	Ni	TYPICAL BORE	② E STD.	MAX. O	MIN. C	SIZE
103	5.44	2.45	2.25	2.0	2.39	4.00	4.00	103
153/154	6.81	3.38	3.12	2.5	3.03	5.25	5.00	153/154
203/204	7.81	4.12	3.88	3.0	3.59	6.00	6.00	203/204
253/254	9.31	4.88	4.62	3.5	4.19	7.50	7.00	253/254
303/304	10.62	5.75	5.44	4.0	4.75	9.00	8.00	303/304
353/354/355	12.28	6.62	6.25/6.18	4.5	5.31	9.75	8.00	353/354/355
403/404/405	13.94	7.44	7.00	5.0	6.03	11.25	10.00	403/404/405
453/454/455	15.56	8.25	7.75	5.5	6.75	12.75	11.00	453/454/455
504/505	16.69	9.00	8.50	6.0	7.41	13.50	12.00	504/505
554/555	18.69	9.81	9.25	6.5	7.94	15.00	13.00	554/555
604/605	20.00	10.62	10.00	7.0	8.56	16.50	14.00	604/605

① Based on 1.5 hub O.D./ bore ratio; larger bores are possible, consult Kop-Flex for specific applications.

② Can be reduced for smaller bores with shorter bore lengths.

③ Minimum shaft separation for standard (E) bore lengths and installation without disturbing connected equipment.

④ API 3rd Edition Rating (0.2 degrees misalignment with full axial misalignment capacity).

⑤ Maximum momentary torque capacity as defined by API 671 is used to evaluate applications such as generators with short circuits. RM and MS interlocking flanges can be modified, along with

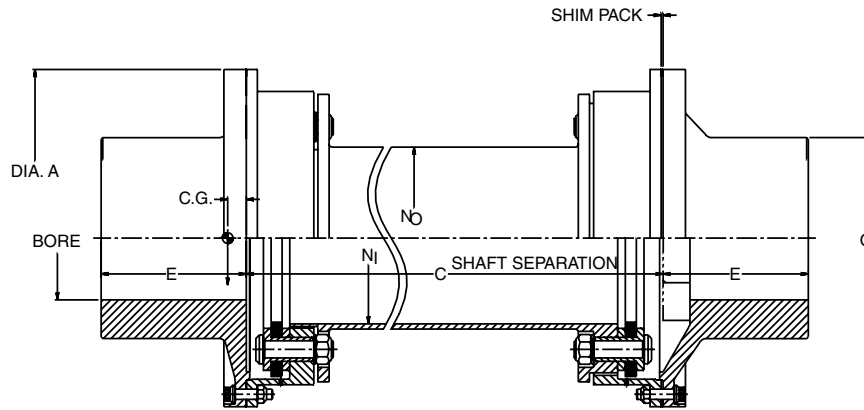
the rest of the coupling, to accommodate capacities 1.5 times this value. Consult Kop-Flex. Other large noncontinuous torques, called transient torques in API 671, such as induction and synchronous motor start-ups, are evaluated using low cycle fatigue analysis. The magnitude and frequency of these transients (peaks) are required information.

⑥ Data based on coupling with 18" shaft separation and nominal tapered bores for keyless hydraulic shaft connections; data can be changed to meet specific requirements.

⑦ Kop-Flex torsional stiffness calculation method.

Specifications and selection data are subject to change without notice.

MS DISC COUPLING (METRIC)



MS COUPLING SELECTION DATA

SIZE	① MAX. BORE CAPACITY (mm)	④ MAX. CON- TINUOUS COUPLING RATING KW/100 RPM	④ MAX. CONTINUOUS TORQUE RATING (kNm)	④ MAX. MOMENTARY TORQUE RATING (kNm)	MAX. SPEED RPM	⑥ TOTAL WEIGHT (kg)	⑥ TOTAL WR ² (kgm ²)	⑥ HALF COUPLING C.G. (mm)	⑥ ⑦ TORSIONAL STIFFNESS K (MNm/rad)	SPACER TUBE/mm		
										K (MNm/rad)	WEIGHT (kg)	WR ² (kgm ²)
103	64	14	1.38	2.19	27700	8.53	.015	3	.06	.04	3.75	.003
153	89	36	3.39	5.39	23100	14.9	.044	5	.16	.12	6.79	.011
154	89	54	5.27	8.38	23100	15.7	.039	5	.19	.12	6.79	.011
203	102	65	6.27	9.97	20200	21.4	.085	9	.27	.21	7.68	.020
204	102	69	9.41	15	20200	21.5	.086	9	.29	.21	7.68	.020
253	127	100	9.66	15.4	16900	34.1	.196	10	.49	.37	9.82	.036
254	127	160	15	23.7	16900	34.6	.199	10	.54	.37	9.82	.036
303	152	160	16	24.6	14800	49.9	.199	12	.90	.72	13.8	.070
304	152	250	24	37.4	14800	50.8	.384	11	1.0	.72	13.8	.070
353	165	260	24	38.8	12800	74.4	.759	11	1.5	1.31	19.0	.127
354	165	390	37	58.7	12800	75.8	1.06	11	1.6	1.31	19.0	.127
355	165	490	46	73.3	12800	75.3	.752	9	1.7	1.50	22.0	.145
403	191	380	36	56.6	11300	107	1.41	10	2.1	2.21	25.2	.212
404	191	560	53	84.9	11300	108	1.41	10	2.5	2.21	25.2	.212
405	191	700	67	106	11300	107	1.38	9	3.2	2.20	24.8	.209
453	216	500	47	74.9	10100	144	2.33	15	3.1	3.42	31.8	.329
454	216	760	73	115	10100	146	2.37	14	3.5	3.42	31.8	.329
455	216	950	91	144	10100	152	2.47	12	2.5	3.50	32.5	.337
504	229	970	92	146	9400	181	3.40	19	4.2	4.48	34.6	.429
505	229	1200	114	181	9400	185	3.37	18	4.6	4.48	34.6	.429
554	254	1300	122	194	8400	250	5.92	17	5.5	6.46	42.3	.622
555	254	1600	153	243	8400	256	5.89	15	6.1	6.46	42.3	.622
604	279	1600	155	246	7900	303	8.20	21	8.1	9.07	50.7	.872
605	279	2100	194	308	7900	310	8.18	20	8.7	9.07	50.7	.872

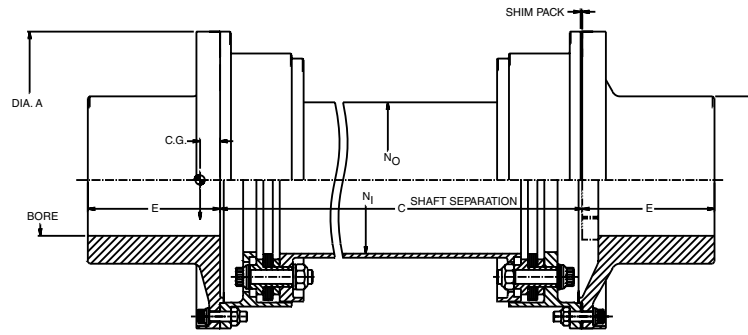
MS DIMENSIONAL DATA

SIZE	A	No	Ni	TYPICAL BORE	② E STD.	MAX. O	MIN. C	SIZE
103	138	62	57	51	61	102	102	103
153/154	183	86	79	64	77	133	127	153/154
203/204	198	105	99	76	91	152	152	203/204
253/254	236	124	117	89	106	191	178	253/254
303/304	270	146	138	102	121	229	203	303/304
353/354/355	312	168	159/157	114	135	248	203	353/354/355
403/404/405	354	189	178	127	153	286	254	403/404/405
453/454/455	395	210	197	140	171	324	279	453/454/455
504/505	424	229	216	152	188	343	305	504/505
554/555	475	249	235	165	202	381	330	554/555
604/605	508	270	254	178	217	419	356	604/605

- ① Based on 1.5 hub O.D./ bore ratio; larger bores are possible, consult Kop-Flex for specific applications.
- ② Can be reduced for smaller bores with shorter bore lengths.
- ③ Minimum shaft separation for standard (E) bore lengths and installation without disturbing connected equipment.
- ④ API 3rd Edition Rating (0.2 degrees misalignment with full axial misalignment capacity).
- ⑤ Maximum momentary torque capacity as defined by API 671 is used to evaluate applications such as generators with short circuits. RM and MS interlocking flanges can be modified, along

- with the rest of the coupling, to accommodate capacities 1.5 times this value. Consult Kop-Flex. Other large noncontinuous torques, called transient torques in API 671, such as induction and synchronous motor start-ups, are evaluated using low cycle fatigue analysis. The magnitude and frequency of these transients (peaks) are required information.
- ⑥ Data based on coupling with 18" shaft separation and nominal tapered bores for keyless hydraulic shaft connections; data can be changed to meet specific requirements.
- ⑦ Kop-Flex torsional stiffness calculation method. Specifications and selection data are subject to change without notice.

MP DISC COUPLING



MP COUPLING SELECTION DATA

SIZE	① MAX. BORE CAPACITY (in)	④ MAX. CONTINUOUS COUPLING RATING HP/100 RPM	④ MAX. CONTINUOUS TORQUE RATING (in-lbs)	⑤ MAX. MOMENTARY TORQUE RATING (IN-LBS)	MAX. SPEED (RPM)	⑥ TOTAL WEIGHT (lbs)	⑥ TOTAL WR ² (lb-in ²)	⑥ HALF COUPLING C.G. (in)	⑥ ⑦ TORSIONAL STIFFNESS K (E6 lb-in/rad)	SPACER TUBE/in		
										K (E6 lb-in/rad)	WEIGHT (lb)	WR ² (lb-in ²)
103	2.5	19	12000	19000	27700	18.5	52	-0.04	0.52	12.1	0.21	0.29
153	3.5	48	30000	48000	23100	33.3	154	0.01	1.4	41.5	0.38	0.99
154	3.5	72	47000	75000	23100	34.3	156	-0.01	1.7	41.5	0.38	0.99
203	4.0	88	56000	89000	20200	47.8	300	0.17	2.3	71.3	0.43	1.71
204	4.0	132	83000	132000	20200	48.5	304	0.14	2.6	71.3	0.43	1.71
253	5.0	135	85000	135000	16900	74.6	669	0.28	4.3	129	0.55	3.10
254	5.0	210	132000	210000	16900	75.5	679	0.25	4.7	129	0.55	3.10
303	6.0	219	138000	219000	14800	109	1290	0.31	7.9	252	0.77	6.04
304	6.0	331	209000	332000	14800	111	1320	0.28	8.8	252	0.77	6.04
353	6.5	343	216000	343000	12800	163	2590	0.26	13	458	1.06	11.0
354	6.5	517	326000	518000	12800	166	2640	0.22	14	458	1.06	11.0
355	6.5	647	407000	647000	12800	169	2670	0.16	15	458	1.06	11.0
403	7.5	501	315000	501000	11300	233	4730	0.23	19	769	1.41	18.4
404	7.5	750	473000	752000	11300	236	4800	0.19	21	769	1.41	18.4
405	7.5	938	591000	940000	11300	240	4840	0.12	24	769	1.41	18.4
453	8.5	660	416000	661000	10100	314	7940	0.44	27	1190	1.78	28.5
454	8.5	1020	642000	1021000	10100	318	8050	0.40	31	1190	1.78	28.5
455	8.5	1270	801000	1274000	10100	320	8050	0.35	29	1190	1.78	28.5
504	9.0	1290	813000	1293000	9400	392	11500	0.56	37	1560	1.94	37.2
505	9.0	1610	1016000	1615000	9400	399	11700	0.50	40	1560	1.94	37.2
554	10.0	1720	1082000	1720000	8400	554	20100	0.41	49	2250	2.37	53.9
555	10.0	2150	1354000	2153000	8400	553	20500	0.35	53	2250	2.37	53.9
604	11.0	2190	1379000	2193000	7900	655	27700	0.62	70	3160	2.84	75.6
605	11.0	2730	1724000	2741000	7900	666	28200	0.55	76	3160	2.84	75.6
655	12.0	3640	2293000	3646000	7000	877	44000	0.33	82	5035	3.60	121
704	13.0	4130	2603000	4139000	6500	1130	69400	0.65	150	7120	4.19	171
705	13.0	5160	3253000	5172000	6500	1150	71100	0.57	160	7120	4.19	171
755	14.0	5810	3663000	5824000	6300	1320	95300	0.46	206	10120	5.10	242
804	14.5	6120	3852000	6125000	6100	1590	140000	0.60	210	11100	5.16	266
805	14.5	7640	4814000	7654000	5900	1650	145000	0.42	250	13443	6.33	322
905	15.0	10330	6516000	10360000	5200	2050	185000	0.76	300	20193	8.64	484
⑩ 1006	18.0	16440	10361000	18240000	4700	3760	501700	1.03	595	36055	11.00	863
⑩ 1106	20.0	23800	15000000	26400000	3000	4950	795000	1.07	830	63830	17.00	1530

MP DIMENSIONAL DATA

SIZE	A	No	Ni	TYPICAL BORE	② E STD.	MAX. O	③ MIN. C	SIZE
103	5.44	2.45	2.25	2.0	2.39	4.00	4.00	103
153/154	6.81	3.38	3.12	2.5	3.03	5.25	5.00	153/154
203/204	7.81	4.12	3.88	3.0	3.59	6.00	6.00	203/204
253/254	9.31	4.88	4.62	3.5	4.19	7.50	7.00	253/254
303/304	10.62	5.75	5.44	4.0	4.75	9.00	8.00	303/304
353/354/355	12.29	6.62	6.25/6.18	4.5	5.31	9.75	8.00	353/354/355
403/404/405	13.94	7.44	7.00	5.0	6.03	11.25	10.00	403/404/405
453/454/455	15.56	8.25	7.75	5.5	6.75	12.75	11.00	453/454/455
504/505	16.69	9.00	8.50	6.0	7.41	13.50	12.00	504/505
554/555	18.69	9.81	9.25	6.5	7.94	15.00	13.00	554/555
604/605	20.00	10.62	10.00	7.0	8.56	16.50	14.00	604/605
655	22.00	11.92	11.22	8.0	9.50	18.00	15.50	655
704/705	24.00	13.12	12.38	8.5	10.38	19.50	17.00	704/705
755	25.60	14.16	13.32	9.0	10.50	20.75	18.00	755
804/805	26.88	14.75	13.94	9.5	11.59	21.75	19.00	804/805
905	30.00	15.60	14.30	10.0	12.00	22.50	20.00	905
1006	34.44	18.25	16.75	13.0	14.00	28.00	24.50	1006
1106	37.88	20.00	18.00	15.0	16.00	31.00	29.50	1106

① Based on 1.5 hub O.D./ bore ratio; larger bores are possible, consult Kop-Flex for specific applications.

② Can be reduced for smaller bores with shorter bore lengths.

③ Minimum shaft separation for standard (E) bore lengths and installation without disturbing connected equipment.

④ API 3rd Edition Rating (0.2 degrees misalignment with full axial misalignment capacity).

⑤ Maximum momentary torque capacity as defined by API 671 is used to evaluate applications such as generators with short circuits. RM and MS interlocking flanges can be modified, along with

the rest of the coupling, to accommodate capacities 1.5 times this value. Consult Kop-Flex.

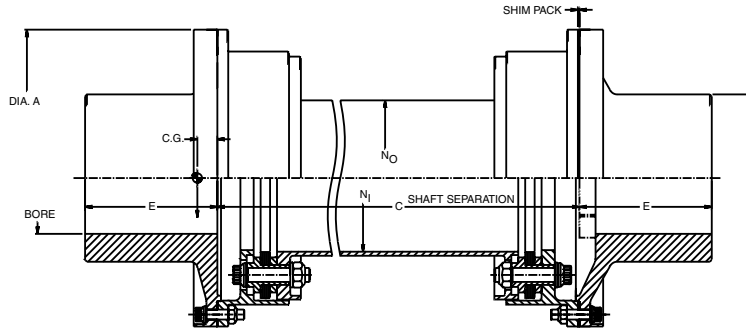
Other large noncontinuous torques, called transient torques in API 671, such as induction and synchronous motor start-ups, are evaluated using low cycle fatigue analysis. The magnitude and frequency of these transients (peaks) are required information.

⑥ Data based on coupling with 18" shaft separation and nominal tapered bores for keyless hydraulic shaft connections; data can be changed to meet specific requirements.

⑦ Kop-Flex torsional stiffness calculation method.

Specifications and selection data are subject to change without notice.

MP DISC COUPLING (METRIC)



MP COUPLING SELECTION DATA

SIZE	① MAX. BORE CAPACITY (mm)	④ MAX. CONTINUOUS COUPLING RATING kW/100 RPM	④ MAX. CONTINUOUS TORQUE RATING (kNm)	⑤ MAX. MOMENTARY TORQUE RATING (kNm)	MAX. SPEED RPM	⑥ TOTAL WEIGHT (kg)	⑥ TOTAL WR2 (kgm2)	⑥ HALF COUPLING C.G. (mm)	⑥ ⑦ TORSIONAL STIFFNESS K (MNm/rad)	SPACER TUBE/mm		
										K (MNm/rad)	WEIGHT (kg)	WR2 (kgm2)
103	64	14	1.38	2.19	27700	8.39	.015	-1	.06	.03	3.75	.003
153	89	36	3.39	5.39	23100	15.1	.045	0	.12	.12	6.79	.011
154	89	54	5.27	8.38	23100	15.6	.046	0	.19	.12	6.79	.011
203	102	65	6.27	9.97	20200	21.7	.088	4	.26	.21	7.68	.020
204	102	99	9.41	15	20200	22.0	.089	4	.29	.21	7.68	.020
253	127	100	9.66	15.4	16900	33.8	.196	7	.49	.37	9.82	.036
254	127	160	15	23.7	16900	34.2	.199	6	.53	.37	9.82	.036
303	152	160	16	24.6	14800	49.4	.378	8	.89	.72	13.8	.070
304	152	250	24	37.4	14800	50.4	.387	7	.99	.72	13.8	.070
353	165	260	24	38.8	12800	73.9	.759	7	1.5	1.31	18.9	.127
354	165	390	37	58.7	12800	75.3	.774	6	1.6	1.31	18.9	.127
355	165	490	46	73.3	12800	76.7	.8	4	1.7	1.5	22.0	.145
403	191	380	36	56.6	11300	106	1.39	6	2.1	2.21	25.2	.212
404	191	560	53	84.9	11300	107	1.41	5	2.4	2.21	25.2	.212
405	191	700	67	106	11300	109	1.4	3	2.7	2.2	24.8	.209
453	216	500	47	74.9	10100	142	2.33	11	3.1	3.41	31.8	.329
454	216	760	73	115	10100	144	2.36	10	3.5	3.41	31.8	.329
455	216	950	91	144	10100	145	2.4	9	3.3	3.5	32.5	.337
504	229	970	92	146	9400	178	3.37	14	4.2	4.48	34.6	.429
505	229	1200	114	181	9400	181	3.43	13	4.5	4.48	34.6	.429
554	254	1300	122	194	8400	251	5.89	10	5.5	6.46	42.3	.622
555	254	1600	153	243	8400	251	6.01	9	6.0	6.46	42.3	.622
604	279	1600	155	246	7900	297	8.12	16	7.9	9.07	50.7	.872
605	279	2100	194	308	7900	302	8.26	14	8.6	9.07	50.7	.872
655	305	2700	259	412	7000	398	12.9	8	9.3	14.6	65.1	.996
704	330	3100	294	467	6500	513	20.3	17	17	20.4	74.8	1.97
705	330	3900	367	584	6500	522	20.8	14	18	20.4	74.8	1.97
755	356	4400	414	658	6300	599	27.9	12	23.3	29.9	94.5	2.88
804	368	4600	435	692	6100	721	41.0	15	24	31.9	92.1	3.07
805	368	5700	544	865	5900	748	42.5	11	28	38.6	113	3.74
905	381	7700	736	1170	5200	930	54.2	19	34	58.0	154	5.58
④ 1006	457	14000	1300	2067	4700	1706	146.8	1	672	109.8	213.2	10.55
④ 1106	508	20000	1881	2991	3000	2245	232.6	27	93.8	183.8	302.7	17.66

MP DIMENSIONAL DATA

SIZE	A	NO	NI	TYPICAL BORE	② E STD.	MAX. O	③ MIN. C	SIZE
103	138	62	57	51	61	102	102	103
153/154	173	86	79	64	77	133	127	153/154
203/204	198	105	99	76	91	152	152	203/204
253/254	236	124	117	89	106	181	178	253/254
303/304	270	146	138	102	121	229	203	303/304
353/354/355	312	168	159/157	114	135	248	203	353/354/355
403/404/405	354	189		127	153	286	254	403/404/405
453/454/455	395	210		140	171	324	279	453/454/455
504/505	424	229		152	188	343	205	504/505
554/555	475	249		165	202	381	330	554/555
604/605	508	270	254	178	217	419	356	604/605
655	559	303	285	203	241	457	394	655
704/705	610	333	314	216	264	495	432	704/705
755	650	360	338	229	267	527	457	755
804/805	683	375	354	241	294	552	483	804/805
905	762	396	363	254	305	572	508	905
1006	875	464	425	330	356	711	622	1006
1106	962	508	457	381	406	787	749	1106

① Based on 1.5 hub O.D./ bore ratio; larger bores are possible, consult Kop-Flex for specific applications.

② Can be reduced for smaller bores with shorter bore lengths.

③ Minimum shaft separation for standard (E) bore lengths and installation without disturbing connected equipment.

④ API 3rd Edition Rating (0.2 degrees misalignment with full axial misalignment capacity).

⑤ Maximum momentary torque capacity as defined by API 671 is used to evaluate applications such as generators with short circuits. RM and MS interlocking flanges can be modified, along with the

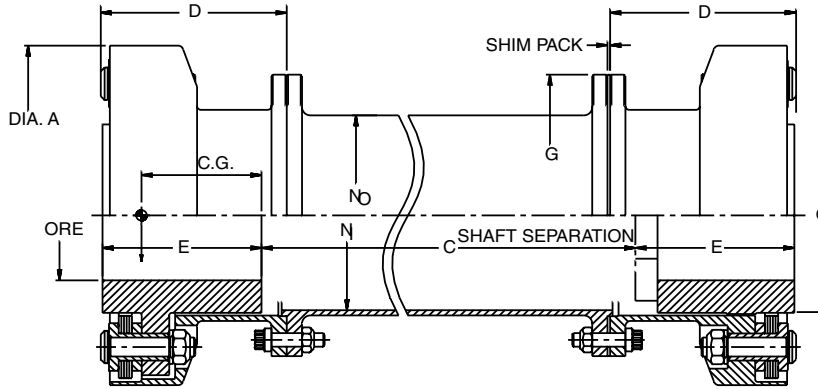
rest of the coupling, to accommodate capacities 1.5 times this value. Consult Kop-Flex. Other large noncontinuous torques, called transient torques in API 671, such as induction and synchronous motor start-ups, are evaluated using low cycle fatigue analysis. The magnitude and frequency of these transients (peaks) are required information.

⑥ Data based on coupling with 18" shaft separation and typical tapered bores for keyless hydraulic shaft connections; data can be changed to meet specific requirements.

⑦ Kop-Flex torsional stiffness calculation method.

Specifications and selection data are subject to change without notice.

RM DISC COUPLING



RM COUPLING SELECTION DATA

SIZE	① NORMAL BORE CAPACITY (in)	④ MAX. CONTINUOUS COUPLING RATING HP/100 RPM	④ MAX. CONTINUOUS TORQUE RATING (in-lb)	⑤ MAX. MOMENTARY TORQUE RATING (in-lb)	MAXIMUM SPEED (RPM)	⑥ TOTAL WEIGHT (lb)	⑥ TOTAL WR ² (in-lb ²)	⑥ HALF COUPLING C.G. (in)	⑥ TORSIONAL STIFFNES K (E6 lb-in/rad)	SPACER TUBE/in		
										K (E6 lb-in/rad)	WEIGHT (lb)	WR ² (lb-in ²)
103	1.5	19	12000	19000	34300	12.6	20	1.74	0.36	9.8	0.23	0.24
153	2.0	48	30000	48000	28600	19.8	59.8	1.83	0.94	30.1	0.32	0.72
154	2.0	72	47000	75000	28600	23.6	80	1.85	0.99	30.1	0.32	0.72
203	2.5	88	56000	89000	23800	32.6	149	2.29	1.8	63.7	0.43	1.53
204	2.5	132	83000	132000	23800	36.3	178	2.31	1.9	63.7	0.43	1.53
253	3.0	135	85000	135000	19900	51.5	355	2.69	3.0	102	0.48	2.43
254	3.0	210	132000	210000	19900	55.5	388	2.71	3.1	102	0.48	2.43
303	3.5	219	138000	219000	17100	78.0	689	3.11	5.7	219	0.75	5.24
304	3.5	331	209000	332000	17100	86.0	808	3.14	6.0	219	0.75	5.24
353	4.0	343	216000	343000	14900	116	1370	3.50	9.2	383	1.00	9.18
354	4.0	517	326000	518000	14900	129	1620	3.53	10	383	1.00	9.18
355	4.0	647	407000	647000	12800	151	1960	3.50	11	475	1.26	11.4
403	4.5	501	315000	501000	13100	167	2570	3.85	14	637	1.33	15.3
404	4.5	750	473000	752000	13100	185	3020	3.89	15	637	1.33	15.3
405	4.5	938	591000	940000	11300	203	3350	3.83	15	790	1.67	18.9
453	5.0	660	416000	661000	11900	221	4030	4.43	20	980	1.67	23.5
454	5.0	1020	642000	1021000	11900	248	4760	4.40	23	980	1.67	23.5
455	5.0	1270	801000	1274000	10100	260	5000	4.37	23	1204	2.08	28.8
504	5.5	1290	813000	1293000	10900	297	7090	4.44	26	1300	1.83	31.2
505	5.5	1610	1016000	1615000	10900	313	7440	4.45	29	1740	2.50	41.6
554	6.0	1720	1082000	1720000	9900	438	12800	5.36	34	1880	2.23	44.9
555	6.0	2150	1354000	2153000	9900	448	13000	5.37	37	2440	2.96	58.4
604	6.5	2190	1379000	2193000	9200	518	17100	5.94	47	2620	2.67	62.7
605	6.5	2730	1724000	2741000	9200	543	17900	5.97	51	3330	3.45	79.6

RM DIMENSIONAL DATA

SIZE	A	D	G	No	Ni	① NOMINAL BORE CAPACITY	② E STD.	MAX. O	③ MIN. C	SIZE
103	4.06	2.75	3.69	2.16	1.91	1.5	2.25	2.25	3.65	103
153/154	5.56	2.94	4.56	3.12	2.88	2.0	2.44	3.00	3.88	153/154
203/204	6.56	3.53	5.47	3.88	3.62	2.5	3.03	3.75	4.62	203/204
253/254	7.84	4.16	6.50	4.62	4.38	3.0	3.59	4.50	4.88	253/254
303/304	9.09	4.69	7.38	5.44	5.12	3.5	4.19	5.25	5.80	303/304
353/354/355	10.47	5.25	8.50	6.25	5.88/5.78	4.0	4.70	6.00	5.88	353/354/355
403/404/405	11.94	6.00	9.47	7.00	6.56/6.44	4.5	5.31	6.75	6.88	403/404/405
453/454/455	13.06	6.60	10.56	7.75	7.25/7.12	5.0	6.03	7.50	7.56	453/454/455
504/505	14.31	7.25	11.44	8.50	8.00/7.81	5.5	6.75	8.25	8.56	504/505
554/555	15.75	8.03	12.62	9.25	8.69/8.50	6.0	7.41	9.00	8.68	554/555
604/605	17.00	8.62	13.50	10.00	9.38/9.19	6.5	7.94	9.75	10.94	604/605

① Based on 1.5 hub O.D./ bore ratio; larger bores are possible, consult Kop-Flex for specific applications.

② Can be reduced for smaller bores with shorter bore lengths.

③ Minimum shaft separation for standard (E) bore lengths and installation without disturbing connected equipment.

④ API 4th Edition Rating (0.2 degrees misalignment with full axial misalignment capacity).

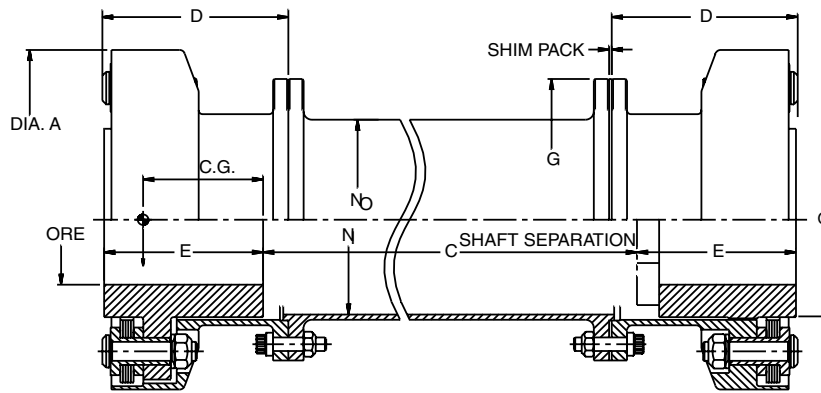
⑤ Maximum momentary torque capacity as defined by API 671 is used to evaluate applications such as generators with short circuits. RM and MS interlocking flanges can be modified, along with the

rest of the coupling, to accommodate capacities 1.5 times this value. Consult Kop-Flex.

Other large noncontinuous torques, called transient torques in API 671, such as induction and synchronous motor start-ups, are evaluated using fatigue analysis. The magnitude and frequency of these transients (peaks) are required information.

⑥ Data based on coupling with 18" shaft separation and nominal tapered bores for keyless hydraulic shaft connections; data can be changed to meet specific requirements. Specifications and selection data are subject to change without notice.

RM DISC COUPLING (METRIC)



RM COUPLING SELECTION DATA

SIZE	① NOMINAL BORE CAPACITY (mm)	④ MAX. CONTINUOUS COUPLING RATING (kW/100 RPM)	④ MAX. CONTINUOUS TORQUE RATING (kNm)	⑤ MAX. MOMENTARY TORQUE RATING (kNm)	MAX. SPEED (RPM)	⑤ TOTAL WEIGHT (kg)	⑤ TOTAL WR ² (kgm ²)	⑥ HALF COUPLING C.G. (mm)	⑥ ⑦ TORSIONAL STIFFNESS K (MNm/rad)	SPACER TUBE/mm		
										K (MNm/rad)	WEIGHT (kg)	WR ² (kgm ²)
103	38	14	1.38	2.19	34300	5.72	.006	44	.04	.03	4.11	.003
153	51	36	3.39	5.39	28600	8.98	.018	46	.11	.09	5.71	.008
154	51	54	5.27	8.38	28600	10.7	.023	47	.11	.09	5.71	.008
203	64	65	6.27	9.97	23800	14.8	.044	58	.20	.18	7.68	.018
204	64	99	9.41	15	23800	16.5	.052	59	.21	.18	7.68	.018
253	76	100	9.66	15.4	19900	23.5	.104	68	.34	.29	8.57	.028
254	76	160	15	23.7	19900	25.1	.114	69	.35	.29	8.57	.028
303	89	160	16	24.6	17100	35.4	.202	79	.64	.63	13.4	.060
304	89	250	24	37.4	17100	39.0	.237	80	.68	.63	13.4	.060
353	102	260	24	38.8	14900	52.6	.401	89	1.0	1.10	17.9	.106
354	102	390	37	58.7	14900	58.5	.475	90	1.1	1.10	17.9	.106
355	102	490	46	73.3	12800	68.0	.570	89	1.2	1.40	22.5	.132
403	114	380	36	56.6	13100	75.8	.753	98	1.6	1.83	23.8	.176
404	114	560	53	84.9	13100	83.9	.885	99	1.7	1.83	23.8	.176
405	114	700	67	106	11300	92.0	.980	97	1.7	2.20	29.5	.216
453	127	500	47	74.9	11900	100	1.18	113	2.3	2.81	29.8	.271
454	127	760	73	115	11900	112	1.39	112	2.6	2.81	29.8	.271
455	127	950	91	144	10100	118	1.46	111	2.6	3.50	37.2	.333
504	140	970	92	146	10900	135	2.08	113	2.9	3.73	32.7	.360
505	140	1200	114	181	10900	142	2.18	113	3.3	4.99	44.6	.480
554	152	1300	122	194	9900	199	3.75	136	3.9	5.40	39.8	.518
555	152	1600	153	243	9900	203	3.81	136	4.2	7.00	52.9	.674
604	165	1600	155	246	9200	235	5.01	151	5.3	7.52	47.7	.723
605	165	2100	194	308	9200	246	5.24	152	5.8	9.56	61.6	.918

RM DIMENSIONAL DATA

SIZE	A	D	G	NO	NI	① NOMINAL BORE CAPACITY	② E STD.	MAX. O	③ MIN. C	SIZE
103	103	70	94	55	49	38	57	57	93	103
153/154	141	75	116	79	73	51	62	76	99	153/154
203/204	167	90	139	99	92	64	77	95	117	203/204
253/254	199	106	165	117	111	76	91	114	124	253/254
303/304	231	119	187	138	130	89	106	133	147	303/304
353/354/355	257	133	216	159	149/147	102	119	152	149	353/354/355
403/404/405	303	152	241	178	167/164	114	135	171	175	403/404/405
453/454/455	332	168	268	197	184/181	127	153	191	192	453/454/455
504/505	363	184	291	216	203/198	140	171	210	217	504/505
554/555	400	204	321	235	221/216	152	188	229	220	554/555
604/605	432	219	343	254	238/233	165	202	248	278	604/605

① Based on 1.5 hub O.D./ bore ratio; larger bores are possible, consult Kop-Flex for specific applications.

② Can be reduced for smaller bores with shorter bore lengths.

③ Minimum shaft separation for standard (E) bore lengths and installation without disturbing connected equipment.

④ API 3rd Edition Rating (0.2 degrees misalignment with full axial misalignment capacity).

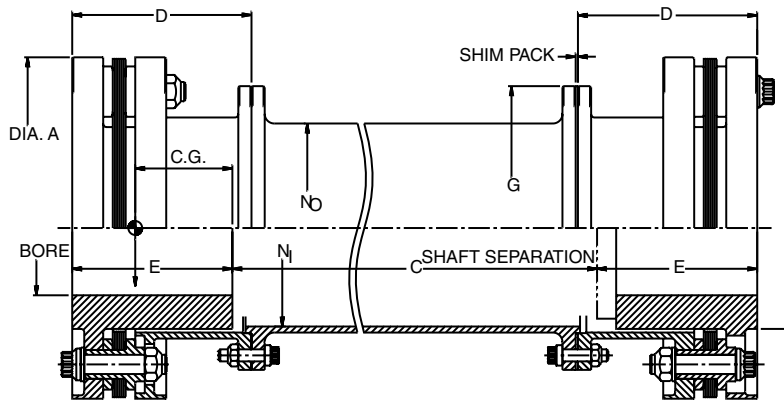
⑤ Maximum momentary torque capacity as defined by API 671 is used to evaluate applications such as generators with short circuits. RM and MS interlocking flanges can be modified, along with the rest of the coupling, to accommodate capacities 1.5 times this value. Consult Kop-Flex.

Other large noncontinuous torques, called transient torques in API 671, such as induction and synchronous motor start-ups, are evaluated using low cycle fatigue analysis. The magnitude and frequency of these transients (peaks) are required information. The transient capacity of Kop-Flex High Performance disc couplings is 1.2 times the max. continuous coupling rating for 10,000 cycles.

⑥ Data based on coupling with 18" shaft separation and nominal tapered bores for keyless hydraulic shaft connections; data can be changed to meet specific requirements.

⑦ Kop-Flex torsional stiffness calculation method. Specifications and selection data are subject to change without notice.

RZ DISC COUPLING



RZ COUPLING SELECTION DATA

SIZE	① NOMINAL BORE CAPACITY (in)	④ MAX. CONTINUOUS COUPLING RATING HP/100 RPM	④ MAX. CONTINUOUS TORQUE RATING (in-lb)	⑤ MAX. MOMENTARY TORQUE RATING (in-lbs)	MAX. SPEED RPM	⑥ TOTAL WEIGHT (lbs)	⑥ TOTAL WR ² (lb-in ²)	⑥ HALF COUPLING C.G. (in)	⑥ ⑦ TORSIONAL STIFFNESS K (E6 lb-in/rad)	SPACER TUBE/IN		
										K (E6 lb-in/rad)	WEIGHT (lb)	WR ² (lb-in ²)
103	1.5	19	12000	19000	34300	13.6	21	1.51	0.36	9.8	0.23	0.24
153	2.0	48	30000	48000	28600	22.1	72.7	1.63	0.90	30.1	0.32	0.72
154	2.0	72	47000	75000	28600	23.6	77	1.57	0.98	30.1	0.32	0.72
203	2.5	88	56000	89000	23800	34.6	163	2.08	1.7	63.7	0.43	1.53
204	2.5	132	83000	132000	23800	35.3	167	2.07	1.8	63.7	0.43	1.53
253	3.0	135	85000	135000	19900	52.5	354	2.42	2.9	102	0.48	2.43
254	3.0	210	132000	210000	19900	53.5	363	2.42	3.0	102	0.48	2.43
303	3.5	219	138000	219000	17100	81.1	732	2.84	5.6	219	0.75	5.24
304	3.5	331	209000	332000	17100	82.5	755	2.84	5.8	219	0.75	5.24
353	4.0	343	216000	343000	14900	121	1460	3.19	8.9	383	1.00	9.18
354	4.0	517	326000	518000	14900	124	1500	3.19	9.2	383	1.00	9.18
355	4.0	647	407000	647000	12800	129	1540	3.07	9.7	475	1.26	11.40
403	4.5	501	315000	501000	13100	174	2720	3.48	13	637	1.33	15.3
404	4.5	750	473000	752000	13100	178	2790	3.48	14	637	1.33	15.3
405	4.5	938	591000	940000	11300	186	2870	3.36	15	790	1.67	18.9
453	5.0	660	416000	661000	11900	229	4260	4.07	19	980	1.67	23.5
454	5.0	1020	642000	1021000	11900	237	4330	4.06	20	980	1.67	23.5
455	5.0	1270	801000	1274000	10100	244	4500	3.97	21	1204	2.08	28.8
504	5.5	1290	813000	1293000	10900	283	6530	3.95	25	1300	1.83	31.2
505	5.5	1610	1016000	1615000	10900	301	6950	3.95	28	1740	2.50	41.6
554	6.0	1720	1082000	1720000	9900	403	1100	4.79	33	1881	2.23	44.9
555	6.0	2150	1354000	2153000	9900	424	11600	4.80	36	2440	2.96	58.4
604	6.5	2190	1379000	2193000	9200	491	15600	5.41	46	2620	2.67	62.7
605	6.5	2730	1724000	2741000	9200	516	16400	5.41	49	3330	3.45	79.6
704	8.0	4130	2603000	4139000	7500	880	42100	6.61	93	6100	4.05	146
705	8.0	5160	3253000	5172000	7500	920	44400	6.62	99	7790	5.28	187
804	9.0	6120	3852000	6125000	6600	1250	76000	7.18	130	10100	5.28	241

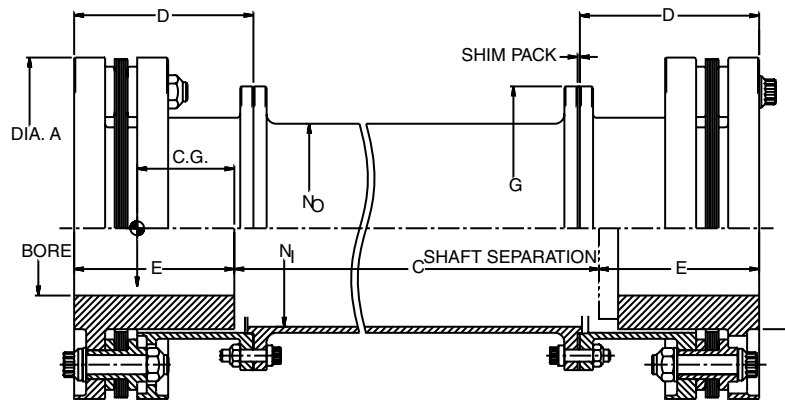
RZ DIMENSIONAL DATA

SIZE	A	D	G	No	Ni	① NOMINAL BORE CAPACITY	② E STD.	MAX. O	③ MIN. C	SIZE
103	3.88	2.75	3.69	2.25	2.00	1.5	2.25	2.12	3.65	103
153/154	5.38	2.94	4.56	3.12	2.88	2.0	2.44	3.00	3.88	153/154
203/204	6.38	3.53	5.47	3.88	3.62	2.5	3.03	3.75	4.62	203/204
253/254	7.62	4.16	6.50	4.62	4.38	3.0	3.59	4.50	4.88	253/254
303/304	8.88	4.69	7.38	5.44	5.12	3.5	4.19	5.25	5.80	303/304
353/354/355	10.12	5.25	8.50	6.25	5.88/5.78	4.0	4.70	6.00	5.88	353/354/355
403/404/405	11.50	6.00	9.47	7.00	6.56/6.44	4.5	5.31	6.75	6.88	403/404/405
453/454/455	12.62	6.60	10.56	7.75	7.25/7.12	5.0	6.03	7.50	7.56	453/454/455
504/505	13.88	7.25	11.44	8.50	8.00/7.81	5.5	6.75	8.25	8.56	504/505
554/555	15.12	8.03	12.62	9.25	8.69/8.50	6.0	7.41	9.00	8.68	554/555
604/605	16.50	8.62	13.50	10.00	9.38/9.19	6.5	7.94	9.75	10.94	604/605
704/705	20.25	10.50	16.00	12.38	11.62/11.38	8.0	9.81	12.00	11.76	704/705
804	22.88	11.88	18.12	13.94	13.06	9.0	11.12	13.50	12.38	804

- ① Based on 1.5 hub O.D./ bore ratio; larger bores are possible, consult Kop-Flex for specific applications.
- ② Can be reduced for smaller bores with shorter bore lengths.
- ③ Minimum shaft separation for standard (E) bore lengths and installation without disturbing connected equipment.
- ④ API 3rd Edition Rating (0.2 degrees misalignment with full axial misalignment capacity).
- ⑤ Maximum momentary torque capacity as defined by API 671 is used to evaluate applications such as generators with short circuits. RM and MS interlocking flanges can be

- modified, along with the rest of the coupling, to accommodate capacities 1.5 times this value. Consult Kop-Flex. Other large noncontinuous torques, called transient torques in API 671, such as induction and synchronous motor start-ups, are evaluated using low cycle fatigue analysis. The magnitude and frequency of these transients (peaks) are required information.
- ⑥ Data based on coupling with 18" shaft separation and nominal tapered bores for keyless hydraulic shaft connections; data can be changed to meet specific requirements.
- ⑦ Kop-Flex torsional stiffness calculation method. Specifications and selection data are subject to change without notice.

RZ DISC COUPLING (METRIC)



RZ COUPLING SELECTION DATA

SIZE	① NOMINAL BORE CAPACITY (mm)	④ MAX. CONTINUOUS COUPLING RATING kW/100 RPM	④ MAX. CONTINUOUS TORQUE RATING (kNm)	⑤ MAX. MOMENTARY TORQUE RATING (kNm)	MAX. SPEED RPM	⑥ TOTAL WEIGHT (kg)	⑥ TOTAL WR ² (kgm ²)	⑥ HALF COUPLING C.G. (mm)	⑥ ⑦ TORSIONAL STIFFNESS K (MNm/rad)	SPACER TUBE/mm		
										K (MNm/rad)	WEIGHT (kg)	WR2 (kgm ²)
103	38	14	1.38	2.19	34300	6.17	.006	38	.04	.03	4.11	.003
153	51	36	3.39	5.39	28600	10.0	.021	41	.10	.09	5.71	.008
154	51	54	5.27	8.38	28600	10.7	.023	40	.11	.09	5.71	.008
203	64	65	6.27	9.97	23800	15.7	.048	53	.19	.18	7.68	.018
204	64	99	9.41	15	23800	16.0	.049	53	.20	.18	7.68	.018
253	76	100	9.66	15.4	19900	23.8	.104	61	.33	.29	8.57	.028
254	76	160	15	23.7	19900	24.3	.106	61	.34	.29	8.57	.028
303	89	160	16	24.6	17100	36.8	.214	72	.63	.63	13.4	.060
304	89	250	24	37.4	17100	37.4	.221	72	.66	.63	13.4	.060
353	102	260	24	38.8	14900	54.9	.428	81	1.0	1.10	17.9	.106
354	102	390	37	58.7	14900	56.2	.440	81	1.0	1.10	17.9	.106
355	102	490	46	73.3	12800	58.5	.451	78	1.1	1.40	22.5	.132
403	114	380	36	56.6	13100	78.9	.797	88	1.6	1.83	23.8	.176
404	114	560	53	84.9	13100	80.7	.817	88	1.6	1.83	23.8	.176
405	114	700	67	106	11300	84.4	.840	85	1.6	2.20	29.5	.216
453	127	500	47	74.9	11900	104	1.25	103	2.1	2.81	29.8	.271
454	127	760	73	115	11900	106	1.28	103	2.3	2.81	29.8	.271
455	127	950	91	144	10100	111	1.32	101	2.4	3.50	37.2	.333
504	140	970	92	146	10900	128	1.91	100	2.8	3.73	32.7	.360
505	140	1200	114	181	10900	137	2.04	100	3.5	4.99	44.6	.480
554	152	1300	122	194	9900	183	3.22	122	3.7	5.40	39.8	.518
555	152	1600	153	243	9900	192	3.40	122	4.1	7.00	52.9	.673
604	165	1600	155	246	9200	223	4.57	137	5.2	7.52	47.7	.723
605	165	2100	194	308	9200	234	4.81	137	5.5	9.56	61.6	.918
704	203	3100	294	467	7500	399	12.3	168	11	17.5	72.3	1.68
705	203	3900	367	584	7500	417	13.0	168	11	22.4	94.3	2.16
804	229	4600	435	692	6600	567	22.3	182	15	28.99	94.3	2.78

RZ DIMENSIONAL DATA

SIZE	A	D	G	No	Ni	① NOMINAL BORE CAPACITY	② E STD.	MAX. O	③ MIN. C	SIZE
103	99	70	94	57	51	38	57	54	93	103
153/154	137	75	116	79	73	51	62	76	99	153/154
203/204	162	90	139	99	92	64	77	95	117	203/204
253/254	194	106	165	117	111	76	91	114	124	253/254
303/304	226	119	187	138	130	89	106	133	147	303/304
353/354/355	257	133	216	159	149/147	102	119	152	149	353/354/355
403/404/405	292	152	241	178	167/164	114	135	171	175	403/404/405
453/454/455	321	168	268	197	184/181	127	153	191	192	453/454/455
504/505	353	184	291	216	203/198	140	171	210	217	504/505
554/555	384	204	321	235	221/216	152	188	229	220	554/555
604/605	419	219	343	254	238/233	165	202	248	278	604/605
704/705	514	267	406	314	295/289	203	249	305	299	704/705
804	581	302	460	354	332	229	282	343	314	804

① Based on 1.5 hub O.D./ bore ratio; larger bores are possible, consult Kop-Flex for specific applications.

② Can be reduced for smaller bores with shorter bore lengths.

③ Minimum shaft separation for standard (E) bore lengths and installation without disturbing connected equipment.

④ API 3rd Edition Rating (0.2 degrees misalignment with full axial misalignment capacity).

⑤ Maximum momentary torque capacity as defined by API 671 is used to evaluate applications such as generators with short circuits. RM and MS interlocking flanges can be modified, along

with the rest of the coupling, to accommodate capacities 1.5 times this value. Consult Kop-Flex. Other large noncontinuous torques, called transient torques in API 671, such as induction and synchronous motor start-ups, are evaluated using low cycle fatigue analysis. The magnitude and frequency of these transients (peaks) are required information.

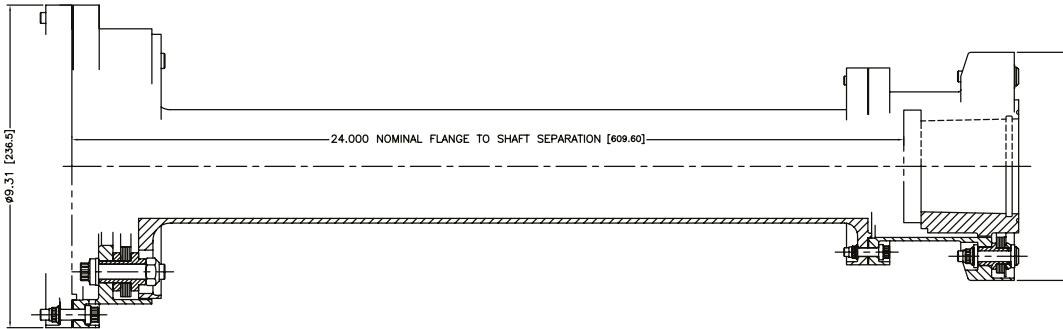
⑥ Data based on coupling with 18" shaft separation and nominal tapered bores for keyless hydraulic shaft connections; data can be changed to meet specific requirements.

⑦ Kop-Flex torsional stiffness calculation method.

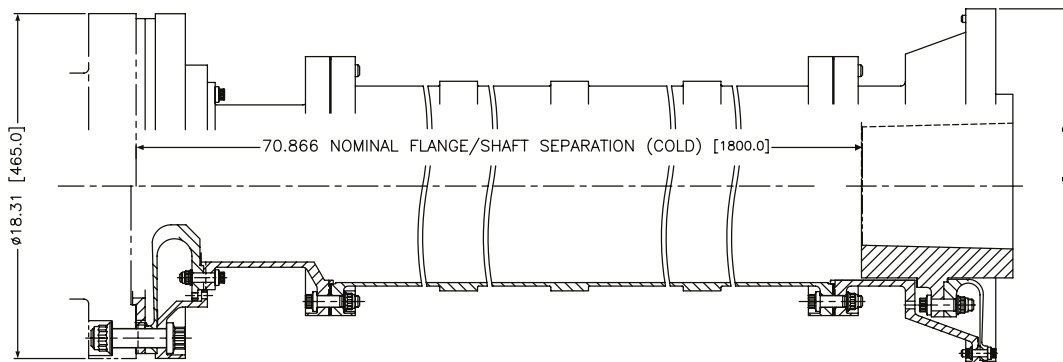
Specifications and selection data are subject to change without notice.

CUSTOM-DESIGNED COUPLINGS

A customer needed to lower the torsional stiffness of an existing HPD1.0 coupling from 2001 in order to meet an acceptable torsional natural frequency margin. The challenge was to meet this torsional stiffness while minimizing the compressor end overhung moment and maintaining an acceptable lateral natural frequency. The customer expected that a titanium spacer would be required; however, with the new HPD2.0 all requirements were met or exceeded with an alloy steel spacer.



This gas turbine to compressor application needed a minimal overhung moment and optimized lateral natural frequency. The Kop-Flex solution achieved this by utilizing a custom marine style diaphragm, a special center section, and a reduced moment diaphragm.



OTHER OPTIONS AVAILABLE

- Speed pick-up teeth
- Turning gear teeth
- Coupling coatings
- Electrically insulated
- Laterally tuned coupling
- Torsional tuned coupling
- Key phasor slot
- Labyrinth seal
- Seal surface
- Overload protection
- Shear spacer section
- Shear pin cartridges
- Special balancing
- Special markings
- Long spacers
- Axial probe reading surfaces
- Alignment tool surfaces
- Shaft flange mounting

HPD2.0 MISALIGNMENT DATA

AXIAL DATA

INCH

SIZE	⑦⑧ MAXIMUM CONTINUOUS AXIAL DISPLACEMENT (in)	MAXIMUM FORCE (lb)
2103	± 0.080	120
2504	± 0.060	210
3004	± 0.070	240
3304	± 0.080	300
3604	± 0.090	360
4104	± 0.105	470
4304	± 0.110	530
4704	± 0.120	610
5104	± 0.130	690
5504	± 0.140	830
5804	± 0.150	940
6204	± 0.160	1100
6504	± 0.170	1300
6904	± 0.180	1400
7404	± 0.190	1600
7904	± 0.205	1900
8604	± 0.225	2100
9404	± 0.240	2400
10104	± 0.260	2800
10804	± 0.280	3400
11604	± 0.300	3800
12404	± 0.320	4400

METRIC

SIZE	⑦⑧ MAXIMUM CONTINUOUS AXIAL DISPLACEMENT (mm)	MAXIMUM FORCE (N)
2103	± 2.05	530
2504	± 1.50	930
3004	± 1.80	1070
3304	± 2.05	1330
3604	± 2.30	1600
4104	± 2.65	2090
4304	± 2.80	2360
4704	± 3.05	2710
5104	± 3.30	3070
5504	± 3.55	3690
5804	± 3.80	4180
6204	± 4.05	4890
6504	± 4.30	5780
6904	± 4.55	6230
7404	± 4.85	7120
7904	± 5.20	8450
8604	± 5.70	9340
9404	± 6.10	10680
10104	± 6.60	12460
10804	± 7.10	15120
11604	± 7.60	16900
12404	± 8.15	19570

ANGULAR DATA

INCH

SIZE	⑧ MAX. MISALIGNMENT (degrees)	BENDING STIFFNESS (lb-in/deg)
2103	0.20	150
2504	0.20	475
3004	0.20	580
3304	0.20	680
3604	0.20	860
4104	0.20	1150
4304	0.20	1320
4704	0.20	1600
5104	0.20	1900
5504	0.20	2250
5804	0.20	2650
6204	0.20	3250
6504	0.20	3650
6904	0.20	4450
7404	0.20	5380
7904	0.20	6700
8604	0.20	8580
9404	0.20	10850
10104	0.20	13430
10804	0.20	16350
11604	0.20	19750
12404	0.20	23500

METRIC

SIZE	⑧ MAX. MISALIGNMENT (degrees)	BENDING STIFFNESS (N-m/deg)
2103	0.20	17
2504	0.20	54
3004	0.20	66
3304	0.20	77
3604	0.20	97
4104	0.20	130
4304	0.20	149
4704	0.20	181
5104	0.20	215
5504	0.20	254
5804	0.20	299
6204	0.20	367
6504	0.20	412
6904	0.20	503
7404	0.20	610
7904	0.20	760
8604	0.20	970
9404	0.20	1230
10104	0.20	1520
10804	0.20	1850
11604	0.20	2230
12404	0.20	2660

HPD1.0 MISALIGNMENT DATA

AXIAL DATA

3 BOLT

SIZE	① AXIAL DISPLACEMENT MAX. CONTINUOUS (in)	MAX. FORCE (lb)
103	± 0.080	120
153	± 0.115	270
203	± 0.140	360
253	± 0.170	430
303	± 0.200	610
353	± 0.230	870
403	± 0.260	1100
453	± 0.285	1300

4 BOLT

SIZE	① AXIAL DISPLACEMENT MAX. CONTINUOUS (in)	MAX. FORCE (lb)
154	± 0.080	400
204	± 0.100	570
254	± 0.120	640
304	± 0.140	900
354	± 0.160	1300
404	± 0.180	1700
454	± 0.200	1900
504	± 0.230	2500
554	± 0.250	3000
604	± 0.270	3300
704	± 0.320	4900
804	± 0.365	7100

5 BOLT

SIZE	② AXIAL DISPLACEMENT MAX. CONTINUOUS (in)	MAX. FORCE (lb)
355	± 0.080	1080
405	± 0.090	1375
455	± 0.100	1930
505	± 0.110	1900
555	± 0.120	2400
605	± 0.130	2800
655	± 0.140	3100
705	± 0.155	4200
755	± 0.165	5850
805	± 0.180	5100
905	± 0.260	11000

6 BOLT

SIZE	② AXIAL DISPLACEMENT MAX. CONTINUOUS (IN)	MAX. FORCE (LB)
1006	± 0.120	6000
1106	± 0.100	8000

ANGULAR DATA

3 BOLT

SIZE	③ MAX. MISALIGNMENT (degrees)	BENDING STIFFNESS (lb-in/deg)
103	0.20	150
153	0.20	340
203	0.20	660
253	0.20	930
303	0.20	1410
353	0.20	2390
403	0.20	3690
453	0.20	4690

4 BOLT

SIZE	③ MAX. MISALIGNMENT (degrees)	BENDING STIFFNESS (lb-in/deg)
154	0.20	650
204	0.20	1270
254	0.20	1800
304	0.20	2730
354	0.20	4600
404	0.20	7100
454	0.20	9020
504	0.20	11800
554	0.20	16000
604	0.20	18700
704	0.20	36100
804	0.20	59000

5 BOLT

SIZE	MAX. MISALIGNMENT (degrees)	BENDING STIFFNESS (lb-in/deg)
355	0.20	8080
405	0.20	11530
455	0.20	15720
505	0.20	20800
555	0.20	27500
605	0.20	32900
655	0.20	54700
705	0.20	59000
755	0.20	80900
805	0.20	89500
905	0.20	121000

6 BOLT

SIZE	MAX. MISALIGNMENT (degrees)	BENDING STIFFNESS (lb-in/deg)
1006	0.16	533000
1106	0.16	664000

① For transient conditions 133% Axial Deflection is allowed for 3 and 4 bolt designs.

② For transient conditions 150% Axial Deflection is allowed for 5 and 6 bolt designs.

③ For higher misalignment capacities, consult Kop-Flex.

HPD1.0 MISALIGNMENT DATA (METRIC)

AXIAL DATA

3 BOLT

SIZE	① AXIAL DISPLACEMENT MAX. CONTINUOUS (mm)	MAX. FORCE (N)
103	± 2.0	534
153	± 2.9	1201
203	± 3.6	1601
253	± 4.3	1913
303	± 5.1	2713
353	± 5.8	3870
403	± 6.6	4891
453	± 7.2	5782

4 BOLT

SIZE	① AXIAL DISPLACEMENT MAX. CONTINUOUS (mm)	MAX. FORCE (N)
154	± 2.0	1779
204	± 2.5	2535
254	± 3.0	2847
304	± 3.6	4003
354	± 4.1	5782
404	± 4.6	7562
454	± 5.1	8451
504	± 5.8	11120
554	± 6.4	13344
604	± 6.9	14678
704	± 8.1	21792
804	± 9.3	31581

5 BOLT

SIZE	② AXIAL DISPLACEMENT MAX. CONTINUOUS (mm)	MAX. FORCE (N)
355	± 2.0	4804
405	± 2.3	6116
455	± 2.5	8585
505	± 2.8	8451
555	± 3.1	10675
605	± 3.3	12454
655	± 3.6	13789
705	± 3.9	18682
755	± 4.2	26021
805	± 4.6	22685
905	± 6.6	48928

6 BOLT

SIZE	② AXIAL DISPLACEMENT MAX. CONTINUOUS (MM)	MAX. FORCE (N)
1006	± 3.0	27000
1106	± 2.5	36000

ANGULAR DATA

3 BOLT

SIZE	③ MAX. MISALIGNMENT (degrees)	BENDING STIFFNESS (Nm/deg)
103	0.20	16.9
153	0.20	38.4
203	0.20	74.6
253	0.20	105
303	0.20	159
353	0.20	270
403	0.20	417
453	0.20	530

4 BOLT

SIZE	③ MAX. MISALIGNMENT (degrees)	BENDING STIFFNESS (Nm/deg)
154	0.20	73.4
204	0.20	143
254	0.20	203
304	0.20	308
354	0.20	520
404	0.20	802
454	0.20	1020
504	0.20	1330
554	0.20	1810
604	0.20	2110
704	0.20	4080
804	0.25	6670

5 BOLT

SIZE	MAX. MISALIGNMENT (degrees)	BENDING STIFFNESS (Nm/deg)
355	0.20	913
405	0.20	1302
455	0.20	1776
505	0.20	2350
555	0.20	3110
605	0.20	3720
655	0.20	6180
705	0.20	6670
755	0.20	9140
805	0.20	10100
905	0.20	13700

6 BOLT

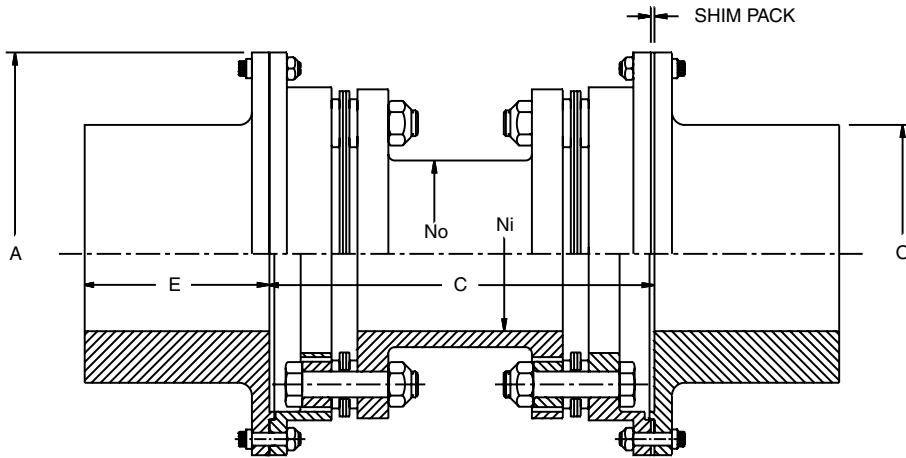
SIZE	MAX. MISALIGNMENT (degrees)	BENDING STIFFNESS (Nm/deg)
1006	0.16	60200
1106	0.16	75000

① For transient conditions 133% Axial Deflection is allowed for 3 and 4 bolt designs.

② For transient conditions 150% Axial Deflection is allowed for 5 bolt designs.

③ These continuous angular misalignment capacities are achievable at reduced max. continuous torque capacities. (See notes on the torque ratings pages.) Consult Kop-Flex.

KS DISC COUPLING



SELECTION DATA

SIZE	① MAX. TORQUE RATING		MAX. SPEED (rpm)	MAX. BORE (in)	② TOTAL WEIGHT (lb)	② TOTAL WR ² (lb-in ²)	② STIFFNESS (E6 lb-in/rad)	SPACER TUBE/IN			SIZE
	CONTINUOUS (in-lb)	PEAK (in-lb)						K (E6 lb-in/rad)	WEIGHT (lbs)	WR ² (lb-in)	
103	6000	8000	14200	2.88	22.0	61	0.3	11.2	.24	.27	103
153	20400	27200	12500	3.88	41.4	187	1.1	33.4	.40	.80	153
204	54000	72000	11100	4.63	69.1	420	2.8	111	.80	2.66	204
254	78000	104000	9900	5.50	99.8	893	4.2	180	.78	4.30	254
304	133500	178000	8700	6.50	152	1770	8.0	336	1.17	8.06	304
354	225000	300000	7500	7.50	240	3730	14	709	1.96	17.0	354
404	322500	430000	6600	9.00	344	6830	21	1020	2.21	24.3	404
454	383000	510000	6000	9.75	455	11400	27	1550	2.54	37.0	454
504	540000	720000	5600	10.75	576	16600	38	2620	3.67	62.6	504
554	758000	1010000	4800	12.00	792	28400	50	3120	3.89	74.7	554
604	990000	1320000	4600	13.00	992	40700	69	4800	5.21	115	604
705	2265000	3020000	3860	15.75	1690	102000	160	12700	9.43	304	705
805	3465000	4620000	3450	18.00	2440	185000	240	21200	12.6	507	805
905	3900000	5200000	3100	20.00	3180	304000	300	27500	11.7	658	905

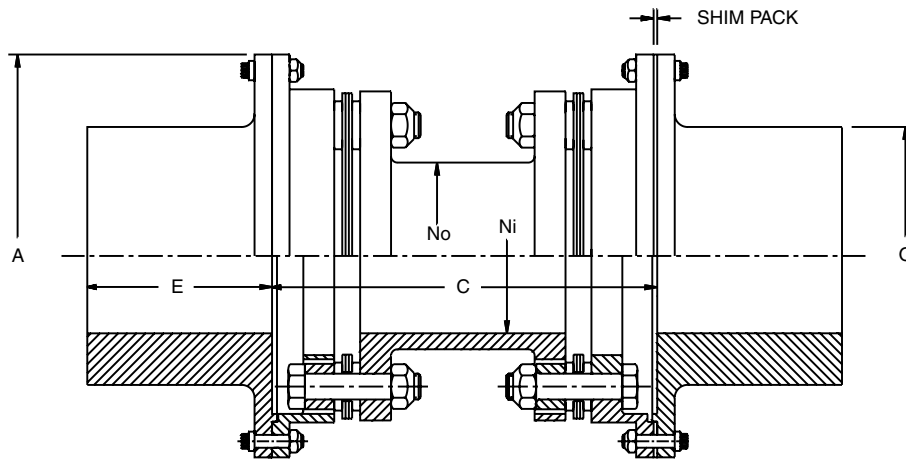
DIMENSIONS AND MISALIGNMENT CAPACITIES

SIZE	A (in)	No (in)	Ni (in)	TYPICAL BORE (in)	TYPICAL E (in)	TYPICAL O (in)	MIN. C (in)	MISALIGNMENT CAPACITIES		SIZE
								AXIAL (in)	ANGULAR (degrees)	
103	5.44	2.25	2.00	2.0	1.94	3.81	4.63	± .080	0.20	103
153	6.81	3.00	2.69	2.5	2.38	4.81	5.75	± .115	0.25	153
204	7.81	3.88	3.38	3.0	3.00	5.75	6.38	± .100	0.20	204
254	9.31	4.88	4.50	3.5	3.56	6.75	6.50	± .120	0.20	254
304	10.62	5.50	5.00	4.0	4.12	7.75	7.75	± .140	0.20	304
354	12.28	6.25	5.50	4.5	4.62	9.00	9.25	± .160	0.20	354
404	13.94	7.00	6.25	5.0	5.25	10.12	10.88	± .180	0.20	404
454	15.56	8.00	7.25	5.5	5.88	11.38	11.25	± .200	0.20	454
504	16.69	8.75	7.75	6.0	6.38	12.25	12.25	± .230	0.20	504
554	18.69	9.25	8.25	6.5	7.00	13.62	13.75	± .250	0.20	554
604	20.00	10.00	8.75	7.0	7.62	14.62	14.63	± .270	0.20	604
705	24.00	12.25	10.38	8.5	9.00	17.50	17.88	± .230	0.15	705
805	26.88	13.75	11.50	9.5	10.00	19.50	20.13	± .260	0.15	805
905	30.00	16.00	14.25	11.0	11.50	22.00	21.38	± .340	0.15	905

① To account for off-design fluctuating or continuous torques, an experience or application factor should be used. API 671 and Kop-Flex recommends 1.5 minimum for general turbomachinery applications.

② Mass elastic data based on couplings with typical bores and 18.00" shaft separation up to #705, and min. C for #805 and #905; design and data can be changed to meet specific requirements. All major components are made of carbon steel.

KS DISC COUPLING (METRIC)



SELECTION DATA

SIZE	① MAX. TORQUE RATING		MAX. SPEED (RPM)	MAX. BORE (mm)	② TOTAL WEIGHT (kgs)	② TOTAL WR2 (kgm2)	TOTAL STIFFNESS (MNm/rad)	SPACER TUBE/mm			SIZE
	CONTINUOUS (kNm)	PEAK						K (MNm/rad)	WEIGHT (kg)	WR2 (kgm2)	
103	.68	.90	14200	73	9.98	.018	.03	.03	4.29	.003	103
153	2.30	3.07	12500	99	18.8	.055	.12	.10	7.14	.009	153
204	6.10	8.14	11100	118	31.3	.123	.32	.32	14.3	.031	204
254	8.81	11.8	9900	140	45.3	.262	.47	.52	13.9	.050	254
304	15.1	20.1	8700	165	68.9	.519	.90	.96	20.9	.093	304
354	25.4	33.9	7500	191	109	1.09	1.6	2.0	35.0	.196	354
404	36.4	48.6	6600	229	156	2.00	2.4	2.9	39.5	.280	404
454	43.3	57.6	6000	248	206	3.34	3.1	4.4	45.4	.427	454
504	61.0	81.4	5600	273	261	4.86	4.3	7.5	65.5	.722	504
554	85.7	114	4800	305	359	8.32	5.6	9.0	49.5	.862	554
604	112	149	4600	330	450	11.9	7.8	14	93.0	1.33	604
705	256	341	3860	400	767	29.9	18	36	168	3.51	705
805	392	522	3450	457	1110	54.2	27	61	225	5.85	805
905	441	588	3100	508	1440	89.1	34	79	209	7.59	905

DIMENSIONS AND MISALIGNMENT CAPACITIES

SIZE	A (mm)	No (mm)	Ni (mm)	TYPICAL BORE (mm)	TYPICAL E (mm)	TYPICAL O (mm)	MIN. C (mm)	MISALIGNMENT CAPACITIES		SIZE
								AXIAL (mm)	ANGULAR (degrees)	
103	138	57	51	51	49	97	118	± 2.0	0.20	103
153	173	76	68	64	60	122	146	± 2.9	0.25	153
204	198	99	86	76	76	146	162	± 2.5	0.20	204
254	236	124	114	89	90	171	165	± 3.1	0.20	254
304	270	140	124	102	105	197	197	± 3.6	0.20	304
354	312	159	140	114	117	229	235	± 4.1	0.20	354
404	354	178	159	127	133	257	276	± 4.6	0.20	404
454	395	203	184	140	149	289	286	± 5.1	0.20	454
504	424	222	197	152	162	311	311	± 5.8	0.20	504
554	475	235	210	165	178	346	349	± 6.4	0.20	554
604	508	254	222	178	194	371	372	± 6.9	0.20	604
705	610	311	264	216	229	445	454	± 5.8	0.15	705
805	683	349	292	241	254	495	511	± 6.6	0.15	805
905	762	406	362	279	292	559	543	± 8.6	0.15	905

① To account for off-design fluctuating or continuous torques, an experience or application factor should be used. API 671 and Kop-Flex recommends 1.5 minimum for general turbomachinery applications.

② Mass elastic data based on couplings with typical bores and 18.00" shaft separation up to #705, and min. C for #805 and #905; design and data can be changed to meet specific requirements.
All major components are made of carbon steel.

FLEXIBLE DIAPHRAGM COUPLINGS

BASIC THEORY OF OPERATION

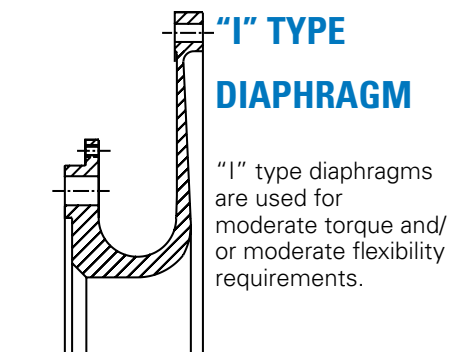
Our diaphragm couplings transmit torque from the driving shaft via a rigid hub then through a flexible diaphragm to a spacer. While transmitting torque to the spacer, the diaphragm deforms to accommodate misalignment. The spacer, in turn, drives matching components attached to the driven equipment.

Kop-Flex has manufactured extremely reliable, maintenance-free diaphragm couplings since the mid-1970's, with well over 100 million hours of operation. Our early experience making diaphragm couplings led us to reexamine prevailing diaphragm design. In 1989, we developed and patented a unique refinement technique eliminating the need for welds and allowed for field replaceable flex elements. In addition, we began to take full advantage of our FEA and computer aided, manufacturing techniques.

Kop-Flex High Performance Diaphragm Couplings combine the positives of competing diaphragm couplings with additional design features such as 15-5 shot peened flex elements and inherent low windage.



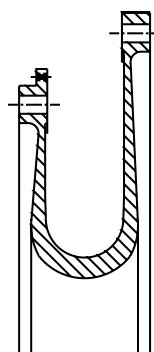
STANDARD DESIGN



"I" TYPE DIAPHRAGM

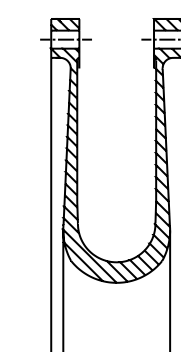
"I" type diaphragms are used for moderate torque and/or moderate flexibility requirements.

OPTIONAL DESIGNS



"J" TYPE DIAPHRAGM

"J" type diaphragms are used for higher torque and/or higher flexibility requirements than the "I" type diaphragm. Consult Kop-Flex for increased capacities.



"U" TYPE DIAPHRAGM

"U" type diaphragms are used for higher torque and/or higher flexibility requirements than the "J" type diaphragm. Consult Kop-Flex for increased capacities.

KOP-FLEX DIAPHRAM FEATURES

FIELD REPLACEABLE, STOCKABLE DIAPHRAGMS

ADVANTAGES

Fast, easy repair
More reliable

The Kop-Flex diaphragm is bolted to the spacer rather than being welded so it can be removed without moving the equipment or removing the rigid hub. This reduces downtime and expense and our no-weld diaphragm design is more reliable.

SPECIALLY CONTOURED ONE-PIECE DIAPHRAGM

ADVANTAGES

Simple, less hardware
Cost competitive
Easy to customize
Quick delivery

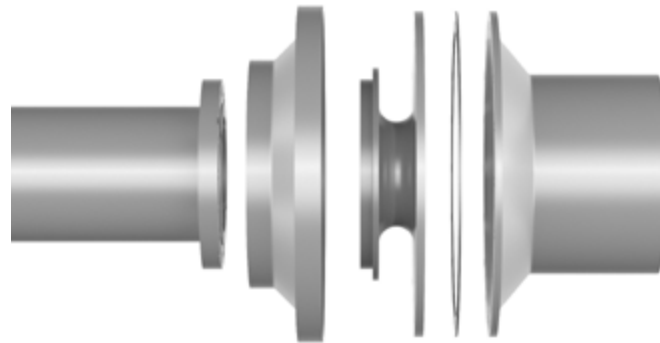
The ability of a diaphragm to transmit torque and handle misalignment depends on the thickness of the diaphragm profile. We use a single stainless steel diaphragm which eliminates the need for extra bolts, rivets, splines and filler rings. The thickness of the diaphragm varies so stress is distributed evenly under the simultaneous effects of torque, speed, axial misalignment and angular misalignment.

PATENTED DIAPHRAGM PROFILE

ADVANTAGES

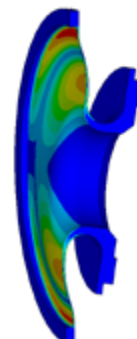
Handles more misalignment
Greater range of torsional stiffness

The unique Kop-Flex diaphragm profile is a single piece of stainless steel. Unlike any competing designs, the diaphragm doubles back before it's attached to the spacer rather than a flat or wavy disc. This delivers more diaphragm in a given space, allowing the Kop-Flex diaphragm to handle more torque, axial misalignment or angular misalignment than competing designs of comparable size.

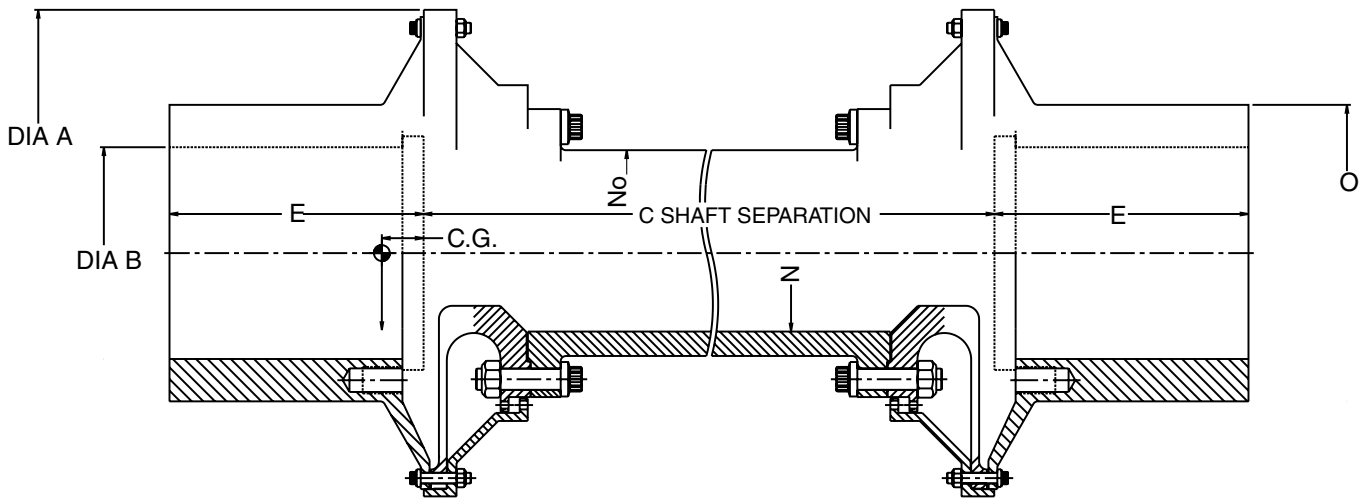


Customized diaphragms for special applications using Finite Element Analysis (FEA).

- No welds
- No splines
- Patented, replaceable flex elements



MS MARINE STYLE DIAPHRAGM COUPLING



MS STYLE SELECTION AND DIMENSIONAL DATA

SIZE	SERIES	① ② MAX CONTINUOUS TORQUE RATING (in-lb)	③ AXIAL RATING PER CPLG. (± in)	③ MISALIGNMENT RATING PER END (± deg)	MAX. SPEED (RPM)	TOTAL WEIGHT (lbs)	TOTAL WR ² (lb-in ²)	HALF COUPLING C. G. (in)	STIFFNESS K (E6 lb-in/rad)	COUPLING OD A (in)	④ BORE (NOMINAL) B (in)	⑤ SHAFT-TO-SHAFT (MIN.) C (in)	SPCER OD N° (in)	E STANDARD (in)	MAX. OD O (in)
1.0	MSM	19000	0.063	0.33	24000	22.2	80	0.53	0.4						
1.0	MSH	25000	0.050	0.25	24000	23.3	80	0.49	0.5	6.00	3.25	4.68	2.33	3.03	4.50
1.0	MSX	36000	0.035	0.20	24000	25.7	80	0.41	0.7						
1.5	MSM	38000	0.075	0.33	20000	35.4	160	0.72	0.9						
1.5	MSH	50000	0.060	0.25	20000	37.4	170	0.67	1.1	7.00	4.00	5.69	2.72	3.59	5.25
1.5	MSX	72000	0.040	0.20	20000	41.5	170	0.58	1.4						
2.0	MSM	89000	0.106	0.33	17000	64	480	0.70	2.4						
2.0	MSH	118000	0.085	0.25	17000	67	490	0.64	3.0	9.16	5.38	6.75	3.59	4.19	7.25
2.0	MSX	170000	0.060	0.20	17000	75	510	0.53	3.8						
2.5	MSM	169000	0.125	0.33	14000	99	1000	0.79	5.1						
2.5	MSH	225000	0.100	0.25	14000	104	1000	0.72	6.2	10.95	6.75	8.31	4.43	4.75	9.00
2.5	MSX	325000	0.070	0.20	14000	117	1100	0.60	7.7						
3.0	MSM	308000	0.156	0.33	13000	166	2500	1.26	10.4						
3.0	MSH	410000	0.125	0.25	13000	175	2500	1.16	12.6	13.09	8.25	9.00	5.31	6.03	11.00
3.0	MSX	590000	0.085	0.20	13000	194	2600	1.00	16						
3.5	MSM	450000	0.175	0.33	12000	226	4500	1.31	17						
3.5	MSH	600000	0.140	0.25	12000	239	4600	1.23	20	14.88	9.50	9.69	6.62	6.56	12.25
3.5	MSX	860000	0.095	0.20	12000	258	4800	1.09	24						
4.0	MSM	690000	0.206	0.33	11000	465	12500	2.43	29						
4.0	MSH	920000	0.165	0.25	11000	480	12600	2.33	34	16.97	11.00	14.31	7.03	9.00	14.25
4.0	MSX	1320000	0.110	0.20	11000	510	13000	2.16	42						
4.5	MSM	1010000	0.231	0.33	10000	581	18600	2.66	43						
4.5	MSH	1350000	0.185	0.25	10000	602	19000	2.55	52	18.97	12.50	15.00	8.06	9.81	16.25
4.5	MSX	1930000	0.125	0.20	10000	639	19500	2.36	62						
5.0	MSM	1410000	0.263	0.33	9000	825	35300	2.86	64						
5.0	MSH	1880000	0.210	0.25	9000	852	35900	2.74	76	21.16	14.00	14.75	9.06	10.88	18.25
5.0	MSX	2710000	0.140	0.20	9000	900	36800	2.55	91						
5.5	MSM	1790000	0.281	0.33	8000	1097	53800	3.25	82						
5.5	MSH	2380000	0.225	0.25	8000	1129	54600	3.14	97	22.91	15.00	18.94	9.69	12.00	19.75
5.5	MSX	3420000	0.155	0.20	8000	1186	55800	2.94	115						

Consult Kop-Flex engineering department for mass elastic data.
Consult Kop-Flex for custom or special designs.

- ① Peak torque rating is 133% of maximum continuous torque rating. Peak torques are defined as intermittent conditions which may occur at multiple intervals (such as break-away start up torques).
- ② Maximum momentary torque rating is 176% of maximum continuous torque rating.

Maximum momentary torques are defined as torsional impact type loads which may occur for one brief duration (such as generator short circuits).

③ Axial and angular capabilities shown are for the "I" type diaphragm. Additional axial and angular capacities can be accommodated with the "J" type or the "U" type diaphragms.

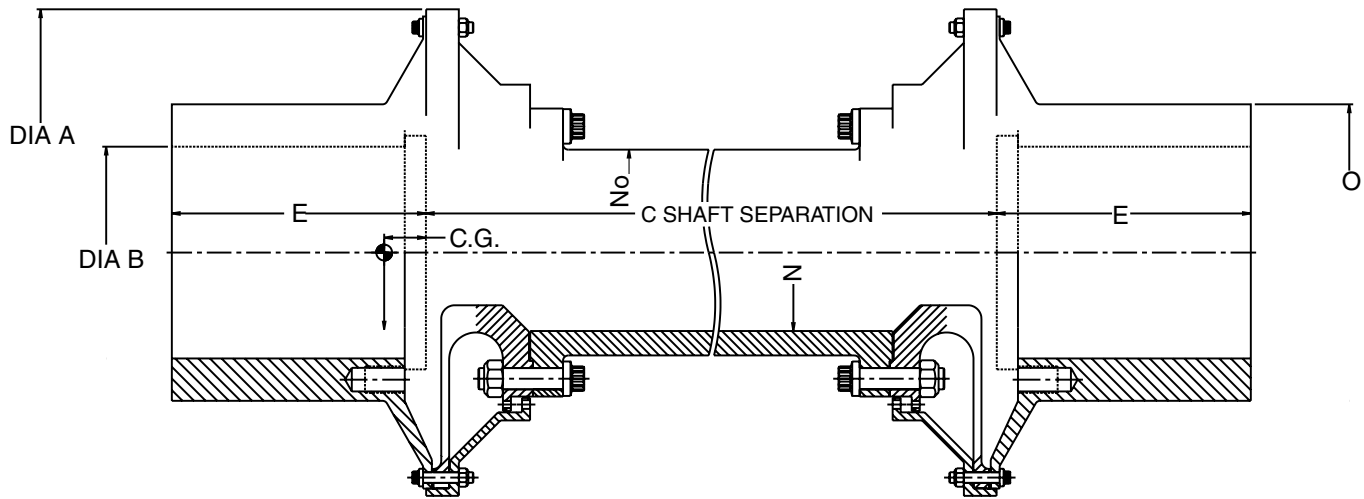
④ Nominal bore capacities are shown. Consult Kop-Flex for higher bore capacities.

⑤ Minimum standard shaft separation is shown. Consult Kop-Flex for shorter shaft separations.

Specifications and selection data are subject to change without notice.

* Consult Kop-Flex for larger sizes and custom-designs.

MS MARINE STYLE DIAPHRAGM COUPLING (METRIC)



MS STYLE SELECTION AND DIMENSIONAL DATA

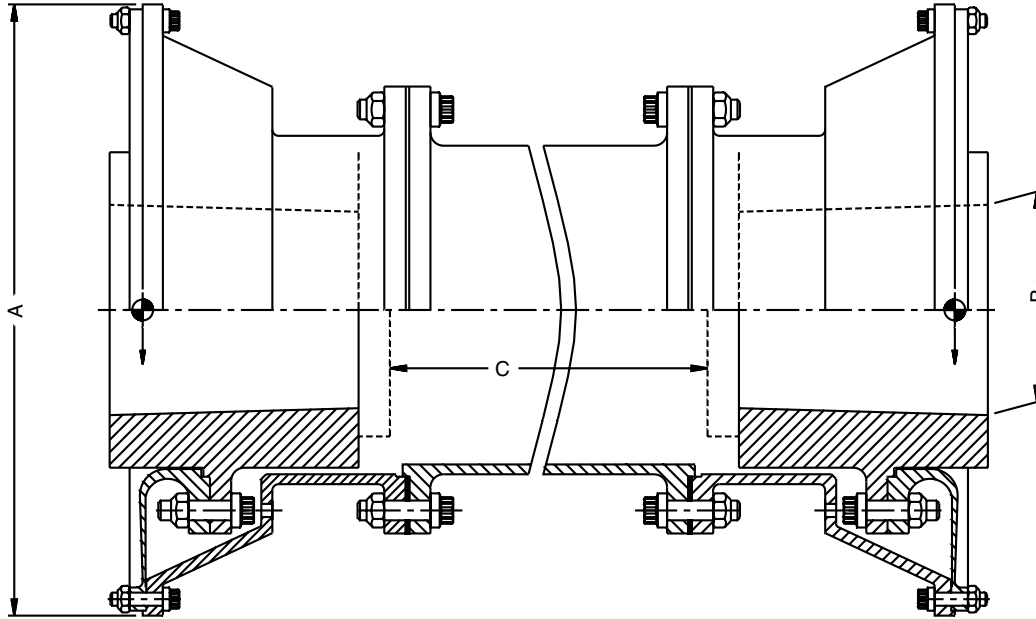
SIZE	SERIES	①② MAX CONTINUOUS TORQUE RATING (kN-m)	③ AXIAL RATING PER CPLG. (± mm)	③ MISALIGNMENT RATING PER END (± deg)	NOMINAL BORE CAPACITY (mm)	MAX. SPEED (RPM)	TOTAL WEIGHT (kg)	TOTAL WR ² (kg-m ²)	HALF COUPLING C. G. (mm)	TOTAL STIFFNESS K (MN-m/rad)	COUPLING OD A (mm)	④ BORE (NOMINAL) B (mm)	⑤ SHAFT-TO-SHAFT (MIN.) C (mm)	SPACER OD N° (mm)	E STANDARD (mm)	MAX. OD O (mm)
1.0	MSM	2.15	1.6	0.33	64	24000	10.1	.023	13	.05						
1.0	MSH	2.82	1.3	0.25	64	24000	10.6	.023	12	.06	152	83	119	59	77	114
1.0	MSX	4.07	0.9	0.20	64	24000	11.7	.023	10	.08						
1.5	MSM	4.29	1.9	0.33	76	20000	16.1	.047	18	.10						
1.5	MSH	5.65	1.5	0.25	76	20000	17.0	.050	17	.12	178	102	145	69	91	133
1.5	MSX	8.13	1.0	0.20	76	20000	18.8	.050	15	.16						
2.0	MSM	10.1	2.7	0.33	89	17000	29.0	.140	18	.27						
2.0	MSH	13.3	2.2	0.25	89	17000	30.4	.143	16	.34	233	137	171	91	106	184
2.0	MSX	19.2	1.5	0.20	89	17000	34.0	.149	13	.43						
2.5	MSM	19.1	3.2	0.33	102	14000	44.9	.293	20	.58						
2.5	MSH	25.4	2.5	0.25	102	14000	47.2	.293	18	.70	278	171	211	113	121	229
2.5	MSX	36.7	1.8	0.20	102	14000	53.1	.322	15	.87						
3.0	MSM	34.8	4.0	0.33	127	13000	75.3	.732	32	1.17						
3.0	MSH	46.3	3.2	0.25	127	13000	79.4	.732	29	1.42	332	210	229	135	153	279
3.0	MSX	66.7	2.2	0.20	127	13000	88.0	.761	25	1.81						
3.5	MSM	50.8	4.4	0.33	140	12000	102.5	1.317	33	1.92						
3.5	MSH	67.8	3.6	0.25	140	12000	108.4	1.346	31	2.26	378	241	246	168	167	311
3.5	MSX	97.2	2.4	0.20	140	12000	117.0	1.404	28	2.71						
4.0	MSM	78.0	5.2	0.33	191	11000	210.9	3.658	62	3.28						
4.0	MSH	103.9	4.2	0.25	191	11000	217.7	3.687	59	3.84	431	279	363	179	229	362
4.0	MSX	149.1	2.8	0.20	191	11000	231.3	3.804	55	4.75						
4.5	MSM	114.1	5.9	0.33	203	10000	263.5	5.442	68	4.86						
4.5	MSH	152.5	4.7	0.25	203	10000	273.1	5.559	65	5.87	482	318	381	205	249	413
4.5	MSX	218.1	3.2	0.20	203	10000	289.9	5.706	60	7.00						
5.0	MSM	159.3	6.7	0.33	229	9000	374.2	10.329	73	7.23						
5.0	MSH	212.4	5.3	0.25	229	9000	386.5	10.504	70	8.59	537	356	375	230	276	464
5.0	MSX	306.2	3.6	0.20	229	9000	408.2	10.768	65	10.28						
5.5	MSM	202.2	7.1	0.33	254	8000	497.6	15.742	83	9.26						
5.5	MSH	268.9	5.7	0.25	254	8000	512.1	15.976	80	10.96	582	381	481	246	305	502
5.5	MSX	386.4	3.9	0.20	254	8000	538.0	16.327	75	12.99						

Consult Kop-Flex engineering department for mass elastic data.
Consult Kop-Flex for custom or special designs.

- ① Peak torque rating is 133% of maximum continuous torque rating. Peak torques are defined as intermittent conditions which may occur at multiple intervals (such as break-away start up torques).
- ② Maximum momentary torque rating is 176% of maximum continuous torque rating. Maximum momentary torques are defined as torsional impact type loads which may occur for one brief duration (such as generator short circuits).

- ③ Axial and angular capabilities shown are for the "I" type diaphragm. Additional axial and angular capacities can be accommodated with the "J" type or the "U" type diaphragms.
 - ④ Maximum bore capacity shown are for straight shaft. Consult Kop-Flex for maximum bore capacity of tapered and keyed shafts.
 - ⑤ Minimum standard shaft separation is shown. Consult Kop-Flex for shorter shaft separations.
- Specifications and selection data are subject to change without notice.
* Consult Kop-Flex for larger sizes and custom-designs.

RM STYLE DIAPHRAGM COUPLING



RM STYLE SELECTION AND DIMENSIONAL DATA

SIZE	⑥ SERIES	①② MAX. CONTINUOUS TORQUE RATING (in-lb)	③ AXIAL RATING PER CPLG. (± in)	MISALIGNMENT RATING PER END (± DEG.)	MAXIMUM SPEED (RPM)	COUPLING O.D. A (in)	④ BORE (NOMINAL) B (in)	⑤ SHAFT-TO-SHAFT (MIN.) C (in)
1.5	RMM	30000	0.050	0.25	24000	6.03	2.00	2.50
2.0	RMM	60000	0.062	0.25	19000	7.35	2.50	2.50
2.5	RMM	100000	0.075	0.25	18000	8.67	3.00	3.12
3.0	RMM	160000	0.088	0.25	15000	10.31	3.50	3.12
3.5	RMM	240000	0.100	0.25	14000	11.63	4.00	3.12
4.0	RMM	342000	0.113	0.25	13000	13.12	4.50	3.50
4.5	RMM	469000	0.125	0.25	12000	14.53	5.00	4.00
5.0	RMM	624000	0.138	0.25	11000	16.09	5.50	4.00
5.5	RMM	810000	0.150	0.25	10000	17.50	6.00	4.50
6.0	RMM	1030000	0.160	0.25	9000	18.82	6.50	4.62

Consult Kop-Flex engineering department for mass elastic data. Consult Kop-Flex for custom or special designs.

- ① Peak torque rating is 133% of maximum continuous torque rating. Peak torques are defined as intermittent conditions which may occur at multiple intervals (such as break-away start up torques).
- ② Maximum momentary torque rating is 176% of maximum continuous torque rating. Maximum momentary torques are defined as torsional impact type loads which may occur for one brief duration (such as generator short circuits).

③ Axial and angular capabilities shown are for the standard RMM series. Consult Kop-Flex for higher axial and angular capacities.

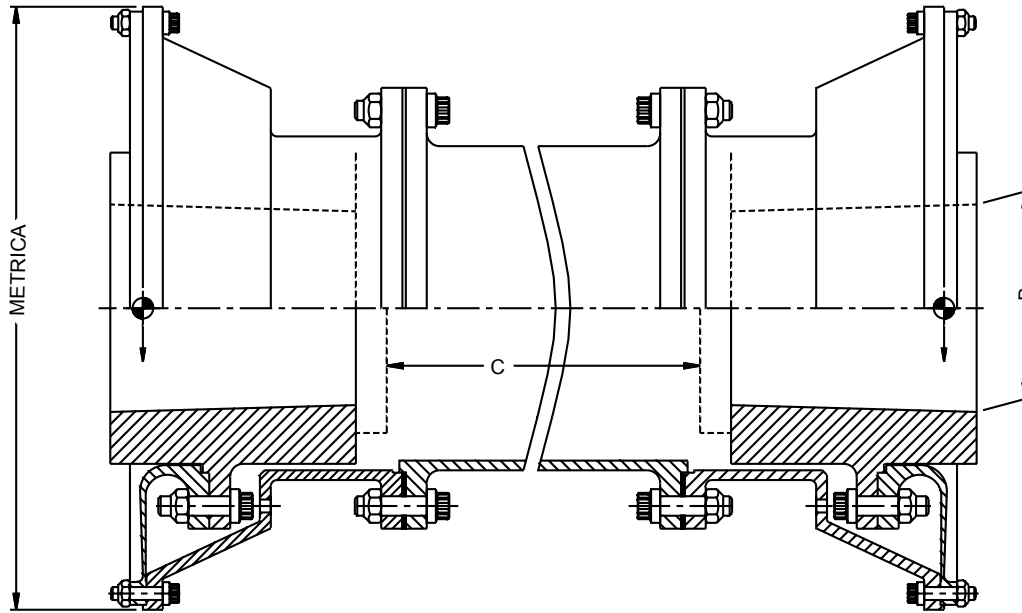
④ Nominal bore capacities are shown. Consult Kop-Flex for higher bore capacities.

⑤ Minimum shaft separation is shown. Consult Kop-Flex for shorter shaft separations.

⑥ Integral hub configuration is offered for sizes 3.0 and below.

* Consult Kop-Flex for larger sizes and custom-designs.

RM STYLE DIAPHRAGM COUPLING (METRIC)



RM STYLE SELECTION AND DIMENSIONAL DATA

SIZE	⑥ SERIES	① ② MAX. CONTINUOUS TORQUE RATING (kNm)	③ AXIAL RATING PER CPLG. (± mm)	MISALIGNMENT RATING PER END (± Deg.)	MAXIMUM SPEED (RPM)	COUPLING O.D. A (mm)	④ BORE (NOMINAL) B (mm)	⑤ SHAFT-TO-SHAFT (MIN.) C (mm)
1.5	RMM	3.39	1.3	0.25	24000	153	51	64
2.0	RMM	6.78	1.6	0.25	19000	187	64	64
2.5	RMM	11.3	1.9	0.25	18000	220	76	79
3.0	RMM	18.1	2.2	0.25	15000	262	89	79
3.5	RMM	27.1	2.5	0.25	14000	295	102	79
4.0	RMM	38.6	2.9	0.25	13000	333	114	89
4.5	RMM	53.0	3.2	0.25	12000	369	127	102
5.0	RMM	70.5	3.5	0.25	11000	409	140	102
5.5	RMM	91.5	3.8	0.25	10000	445	152	114
6.0	RMM	116	4.1	0.25	9000	478	165	117

Consult Kop-Flex engineering department for mass elastic data.
Consult Kop-Flex for custom or special designs.

① Peak torque rating is 133% of maximum continuous torque rating. Peak torques are defined as intermittent conditions which may occur at multiple intervals (such as break-away start up torques).

② Maximum momentary torque rating is 176% of maximum continuous torque rating. Maximum momentary torques are defined as torsional impact type loads which may occur for one brief duration (such as generator short circuits).

③ Axial and angular capabilities shown are for the standard RMM series. Consult Kop-Flex for higher axial and angular capacities.

④ Nominal bore capacities are shown. Consult Kop-Flex for higher bore capacities.

⑤ Minimum shaft separation is shown. Consult Kop-Flex for shorter shaft separations.

⑥ Integral hub configuration is offered for sizes 3.0 and below.

*Consult Kop-Flex for larger sizes and custom-designs.

ENGINEERING DATA

BALANCING

Kop-Flex high performance couplings are designed with balancing in mind. They are balanced to low levels of residual unbalance and, in contrast to other types of couplings, are built to retain their balance quality. There are no clearances between mating parts and no parts to wear (like gear teeth in gear couplings). The connections between major components have light interference fits. Kop-Flex high performance couplings can be balanced to any of the API standard 671 options. A component balance permits the interchange of duplicate coupling components. The assembly can then be subsequently check balanced without balance corrections. A final balance correction can be made on the assembly after the assembly check. However, this prohibits the later interchange of coupling components. If specified, residual unbalance or balance repeatability tests can be performed in accordance with API 671. Balancing is done on precision hard-bearing balance machines. A minimal amount of ancillary tooling is used in order to reduce the associated clearance and runout errors. Major components are match-marked to assure proper reassembly of balanced couplings. Bolts and nuts are individually weigh balanced, which allows the interchanging of any bolt or any nut. Field balance holes can also be provided at the request of the customer.

SHIPPING SCREWS

Shipping screws lock and stabilize the flexing subassembly during machining, balancing and shipping. They also provide built-in tooling to collapse the disc packs during the installation procedure.

PRESTRETCH

Prestretch is the axial stretch of the flex elements established at coupling installation to accommodate changes in shaft separation, such as thermal growth. Prestretching ensures that they will run in the neutral position at normal operating conditions. Thus, axial misalignment related stresses will be minimized.

WINDAGE

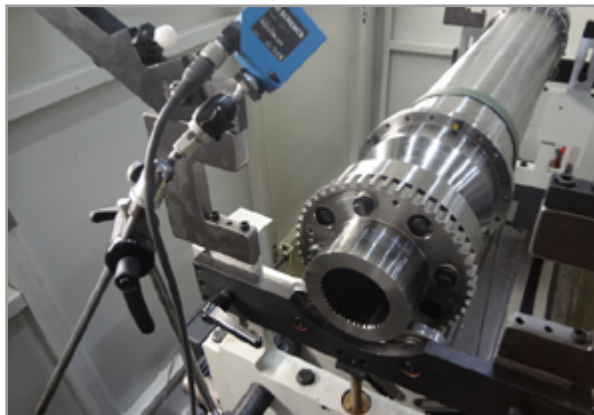
When couplings rotate at high speeds in enclosures, the resulting air movement generates heat and pressure differentials. This “windage” should be considered in the design of couplings and enclosures, especially when replacing a gear coupling with a dry one. Kop-Flex has authored a paper, “Design of Coupling Enclosures,” which is available along with a program for predicting coupling and guard temperatures. Contact Kop-Flex for this “windage” package or for enclosure design recommendations.

INSTALLATION

Factory assembled, disc pack units greatly simplify the installation of Kop-Flex high performance disc couplings. For reduced moment style couplings, installation consists of mounting the preassembled hub/sleeve/flex element assemblies onto the equipment shafts. The spacer is then bolted to the sleeve flanges. For marine style couplings, rigid hubs are mounted on the equipment shafts, then a factory assembled center section is bolted to the rigid hub flanges. Installation instructions and a general arrangement drawing are supplied with each coupling.

SHIMMING

Two identical steel shim packs are provided with each Kop-Flex high performance coupling. These packs consist of individual shims of various thicknesses. The coupling is designed to use one full shim pack if the actual installation shaft or flange separation matches the design start-up separation. This allows for a total spacing adjustment of plus or minus the thickness of one pack.



MOMENT SIMULATOR

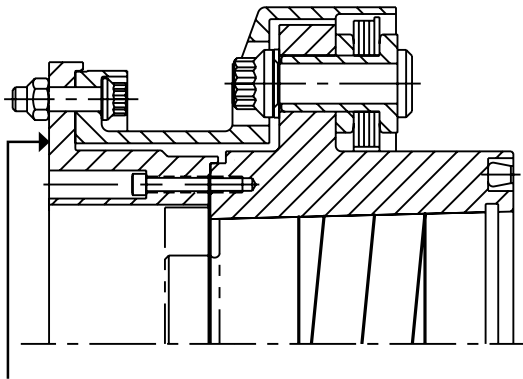
MOMENT SIMULATOR FOR SENSITIVE ROTOR BALANCE

HIGH SPEED BALANCING FOR ROTORS REQUIRING REDUCED MOMENT COUPLINGS

When do you need a special moment simulator?

For high speed turbomachinery applications with relatively small diameter shaft mounts – say 15000 rpm with 4 inch (100 mm) shaft mounts - a reduced moment flexible element coupling is a must to keep the rotor sensitivity to unbalance low.

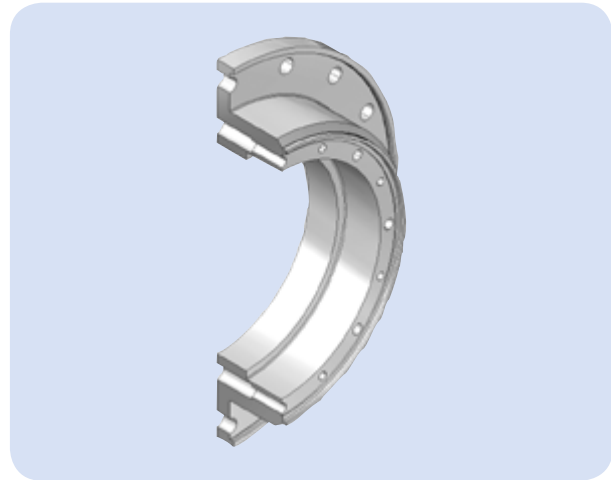
When one of these rotors needs to be balanced at speed, it's best to simulate the effects of the coupling mass on the end of the rotor. This is particularly important if the rotor has an extra long overhang from the bearing or if the rotor will otherwise operate close to its lateral critical speed.



DOUBLE PILOTED MOMENT SIMULATOR

ADVANTAGES OF KOP-FLEX MOMENT SIMULATOR TECHNOLOGY

- Flexible pilots with high interference fits
- Parts are exactly centered
- Part centering and balancing is repeatable
- Plate is designed to simulate overhung moment of the coupling in normal operation



THE KOP-FLEX PATENTED MOMENT SIMULATOR SOLUTION FOR SENSITIVE ROTOR BALANCE

To solve the problem, Kop-Flex has developed a patented, double-piloted moment simulator adapter for reduced moment couplings, which has Kop-Flex flexible pilot technology. This adapter precisely locates the hub, flexible element, spacer adapter (sleeve) in a concentric, locked, repeatable position, so that the balancing operations can occur.

The flexible pilots allow for high interference register fits that keep their interference. All parts are exactly centered during the low speed, coupling assembly-only balance, rotor shaft installation and the at-speed balance or balance-check operation.

SOLO PLATES

Two types of solo plates are available. These are a moment simulator plate and a solo adapter plate.

A moment simulator plate simulates the connected coupling bending moment on the shaft when required for testing. A solo adapter plate is used to lock together a coupling subassembly for uncoupled equipment operation, and is an option in API 671.

KOP-FLEX POWERLIGN TORQUE

MONITORING SYSTEM

FROM SIMPLE DIAGNOSTICS TO TRUE CONTROL

From the invention of Fast's – the world's first gear coupling – to today's high performance couplings, Kop-Flex has a rich industry background and a reputation for solving customer problems.

Today, torquemeters are increasingly being used to measure power, speed and torque on critical rotating machine equipment.

As the only company in the world that has developed an integrated coupling-torquemeter solution, Kop-Flex provides the Powerlign Torque Monitoring System.

As the most reliable, accurate torquemeter available in today's marketplace, the digital Powerlign replaced the proven, analog Powerlign system that has served the market for years. Powerlign features a patented, unique architecture that allows for more advanced system control with full integration support for distributed control systems (DCS) or PCs and laptops for analyzing system data.

Powerlign acts as an important part of a system by establishing certain thresholds that can be configured to trigger an alert or alarm. Powerlign can also be used as a control system to shut down equipment or direct the in flow of gas or fuel to maintain load and efficiency.



Torque differentials can indicate performance problems such as blade fouling. When performance declines, more fuel is burned and NOx emissions increase. Torquemeters provide a cost-effective method for diagnosing these problems early on so you can make the necessary adjustments to your system for a proactive maintenance plan.

KEY BENEFITS

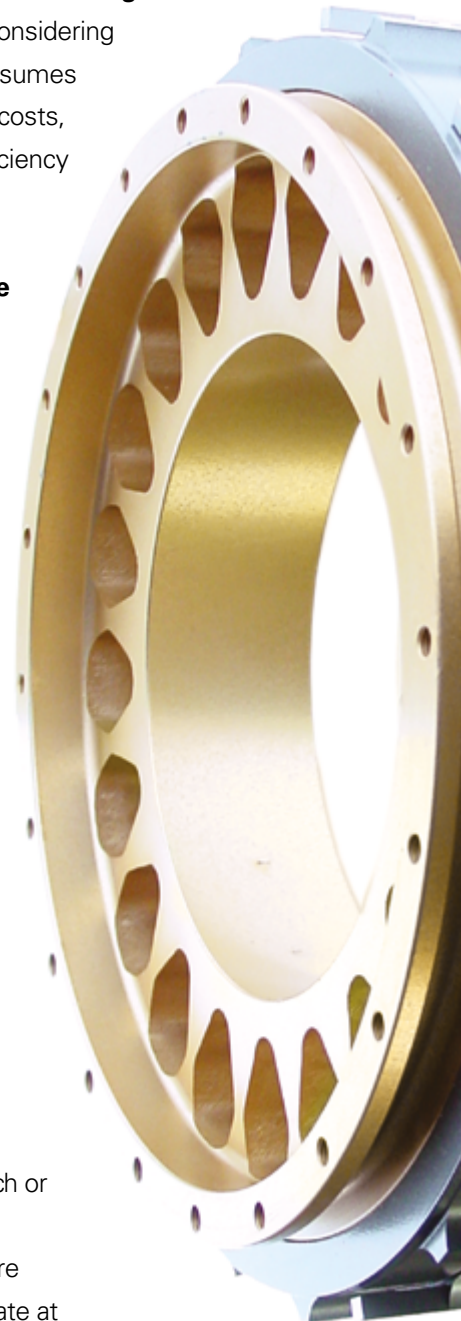
- All **digital** phase-shift, non-strain gauge system
- As a **single source supplier** of couplings and torque meters, Kop-Flex eliminates coordination and design integrity issues that occur with multiple suppliers
- **Accurate torque measurement** within $\pm 1\%$ of full scale torque.
- **Safety and reliability** – unlike other torque measuring devices, no electronics or electrical power is present in the coupling or in the coupling environment
- **Seamless integration** – connect the Powerlign conditioning unit directly to a DCS running public or private MODBUS protocol, reducing the cost of setting another box or training your operator to use a new system
- **Retrofit** - For most applications, a new instrumented spacer can be inserted without disturbing the existing flex half couplings
- Specially configured MODBUS communication protocol available to fit with your **existing DCS**
- **Significant cost savings** – considering that a 40MW gas turbine consumes \$8,000,000/year in 2015 fuel costs, a one percent increase in efficiency equates to \$80,000 in annual savings
- **Completely interchangeable** components and no need for recalibration
- **Highly flexible** – fewer components, easier to install and no need to disturb or modify any vents, drains, filters, etc.
- ATEX, CE and CSA Zener Barriers certification for explosion proof sensors (Div I), intrinsically safe conditioning unit and display unit (Div II) operation
- RS-232 digital, RS-485 digital and 4-20mA analog output
- Decreased lead times
- Reduced wiring cost
- Uses existing coupling guard
- User configurable imperial inch or metric (SI) units
- Built-in, automatic temperature compensation; sensors operate at temperatures as high as 350° F (177°C) to accommodate the most demanding environments

Consistent Accuracy

The accuracy rating is determined as a root sum of the squares series of all the individual errors possible, both electrical and mechanical.

The mechanical inaccuracies include allowances for the inevitable movements of the coupling in relation to the guard-mounted sensor, during hot and cold cycles of equipment operation. These are the radial gap and axial movement errors. Other mechanical errors are possible from the various calibrations and set-ups.

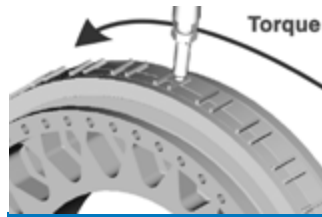
Electrical items include sensor variation and conditioning unit variation. Note that because these errors are included in the overall budget, sensors and boxes from the factory or stock can be swapped out in the field without degradation of accuracy. Powerlign is accurate to within one percent of full scale torque.



POWERLIGN



Powerlign/Powerwheel pick up teeth shown with one sensor (second not shown is at 180°.)



Pick up teeth under torque (torsional deflection).

HOW THE POWERLIGN SMART SPACER & POWERWHEEL WORK

POWERWHEEL OR SMART SPACER – Powerwheel features the same patented design as the Smart Spacer in a smaller footprint with a specifically profiled double-sided wheel, where teeth mounted to the outer diameter of one wheel move relative to teeth mounted on the mating wheel. Similar to Smart Spacer, sensors detect this movement but instead, deflection occurs in profiled spokes in each wheel in combination with a short, tubular section that connects the wheels.

SENSORS – two, monopole sensors, from reference points on the wheel, pick up this torsional twist. The sensors are mounted on the existing coupling guards by welding a boss plate to the guards, hence they do not rotate with the coupling and the pick-up teeth. The sensors are inserted into the boss plates, and the gap is set with a depth micrometer or feeler gauges. As each set of teeth passes the sensor, a waveform is created.

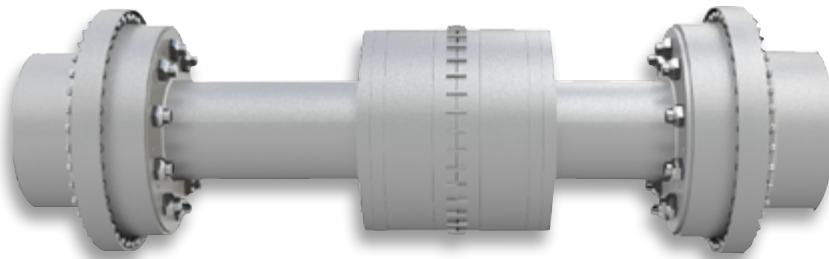
CONDITIONING UNIT – the waveform is transmitted to a processor within the conditioning unit, which translates the twist into torque based on a series of measurements and constants. It also monitors the coupling's speed and temperature. Internal circuits continuously use temperature information to automatically compensate for temperature-associated changes in coupling stiffness. Because processing occurs close to the sensors, greater accuracy results due to reduced wire transmission.

The conditioning unit is mounted within 500 feet of the sensors and transmits data via cable, RS-485 and a public MODBUS protocol (an industry standard format, recognizable by most DCS). Powerlign can also be configured to transmit data over wireless networks or other communication protocols. (Contact Kop-Flex for details.) The conditioning unit also automatically checks and corrects itself every 24 hours for any electronic drift, eliminating the need for field calibration.

STANDALONE DISPLAY UNIT – the standalone unit receives the digital signal and displays, speed and temperature data at approximately one-second intervals. This provides a greater range for signal transmission to the standalone display unit or the DCS, eliminating the need for expensive, cross-site cabling and providing flexibility in locating the diagnostic system. The display unit provides RS-232 digital and 4-20 mA analog output signals.

DCS (in lieu of display unit) – the conditioning unit can connect directly to your DCS, via RS-485 cable or wireless (as an option) using public or private MODBUS protocol.

SMART SPACER



POWERWHEEL



THE ORIGIN OF POWERWHEEL

To develop Powerwheel, Kop-Flex modified the same, proprietary, numerical analysis used for Kop-Flex diaphragm couplings then proved the design software with FEA, R&D and field tests. One back-to-back test connected a Powerwheel directly to a Smart Spacer torque meter, loaded with torque at high speeds. Each meter had a separate probes and an independent electronic system. Correlation results were excellent, within 0.3% of full-scale torque.

MAJOR CUSTOMERS AND APPLICATIONS

OEMs

Dresser Rand
Ebara
Elliott
GE Oil & Gas
MAN Turbo
Mitsubishi
Nuovo Pignone (G.E.)
Planergy
Rolls Royce
Siemens
Solar Turbines

Users:

BP
Exxon Mobil
Linde Adnoc
Nova Chemical
Petrokemya
Petronas
SECL Malaysia
Sulzer
Syncrude
Transcanada Pipeline

Applications:

Petrochemical plants
Gas pipelines
Natural gas
Refineries
LNG
Test stands
Power plants
Performance testing
Gas reinjection

Equipment:

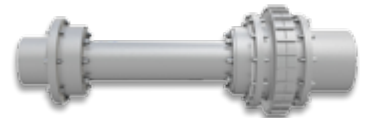
Compressor
Motor
Gas or Steam Turbine
Expander

Capabilities	Smart Spacer	Powerwheel
Torque	No upper limit	No upper limit
Speed	Typically up to 8,000 RPM	Up to 20,000 RPM
Shaft Separation	18 to 48 inches (.5 to 1.2m)	5 to 180 inches (127mm to 4.5 m)
Unbalance Sensitivity	For less sensitive	For more sensitive
Retrofit Application	Well suited	Ideal

TYPES OF TORQUEMETERS

Phase displacement torque meter – measures coupling spacer twist when torque is applied by measuring the change in phase or shift between the two sets of pick-up teeth. Both Smart Spacer and Powerwheel are phase displacement torque meters. Phase displacement is the better choice for long-term use because it provides uninterrupted service, higher accuracy and does not require field-calibration.

Strain gauge torque meter – has a strain gauge or Wheatstone bridge attached to the spacer. An FM signal is transmitted to the processor through a stator ring. Although there have been many successful field installations, users consider the strain-gauge torque meter as a weak system as it loses accuracy and reliability over time and has temperature limitations.



RETROFITTING: For years, retrofitting turbomachinery equipment with torque meter systems was almost impossible. The modular Powerwheel Performance Torque Monitoring System solves this problem. A shorter replacement coupling, or existing coupling spacer, are designed to meet the torque and speed requirements, retrofit criteria and envelope dimensions of the existing application. The modular wheel is a drop-in component of the high-speed coupling. In most cases, the existing guard can be utilized, eliminating the high cost of designing and manufacturing a new guard. Powerwheel can be retrofitted in any coupling, regardless of the manufacturer. Every effort is made to match the mass elastic data of the coupling to ensure reliable, trouble-free operation. Powerwheel also offers designers the ability to move the wheel to a more suitable location when lateral critical speed is a concern.



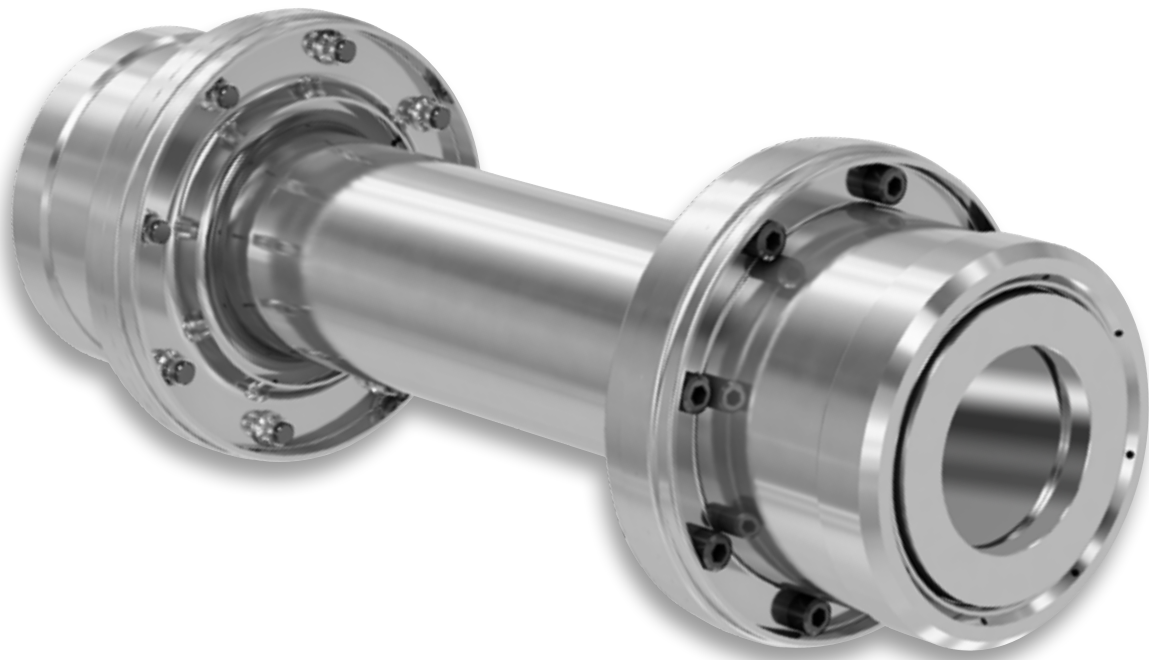
AC SERIES HIGH PERFORMANCE GEAR COUPLINGS

APPLICATION

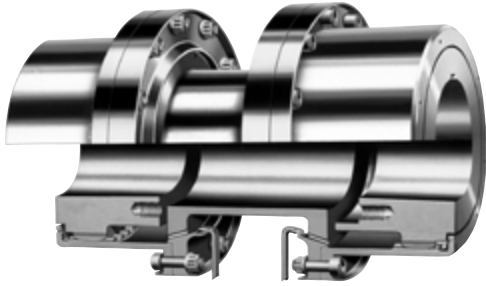
The Series AC coupling design is intended for high performance applications where either high speed or high torque operating conditions prevail. The actual capacity of the coupling is a function of the combination of load, speed and alignment accuracy. The material used is low alloy steel, heat-treated to attain optimum properties of strength, hardness and toughness. The properties of the material in the heat-treated state, therefore, allow for much higher torque loads than for other coupling classifications, which use carbon steel.

DESCRIPTION

The Series AC coupling is held to the close manufacturing tolerances consistent with industrial practice. These highly accurate tolerances allow the coupling to be more accurately, dynamically balanced and also allow inherently higher torque capacities than if the manufacturing tolerances were equivalent to the standard type coupling. The mating flanges of the coupling and spacers used are positioned to each other by accurately turned rabbets to maintain repetitive accurate dynamic balance should the coupling ever, for any reason be disassembled and reassembled. The root of the sleeve teeth and this spherical major diameter of ball of the hub teeth are closely fitted to maintain accurate concentricity. This is important in maintaining dynamic balance.



ACCS/RM



KHP HIGH PERFORMANCE COUPLING GREASE

KHP grease is an NLGI #1 grease with E. P. additives, which exceeds the design requirements needed for extended operating and relubrication intervals. KHP grease is recommended for high-speed, grease lubricated, gear couplings in petrochemical, process and utility industries.

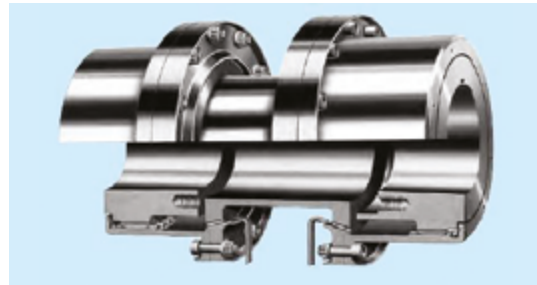
ACCS/RMD

The ACCS/RMD provides the same benefits as the ACCS/RM in a damless design.



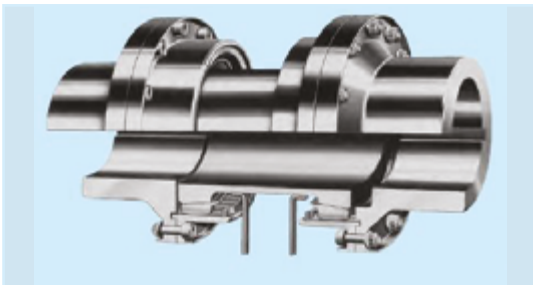
ACCS/RM

The ACCS/RM Coupling is a continuous oil lubricated coupling in a reduced moment design in a lightweight, power dense design.



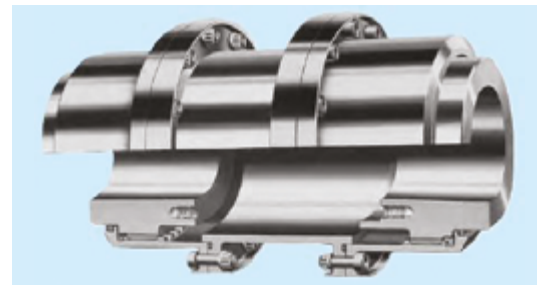
ACCM

The ACCM is a continuous oil lubricated design in a marine style package, allowing for the flex elements to be replaced without removing the rigid hubs.



ACPL

The ACPL is a packed lubrication design used for low to moderate speed applications



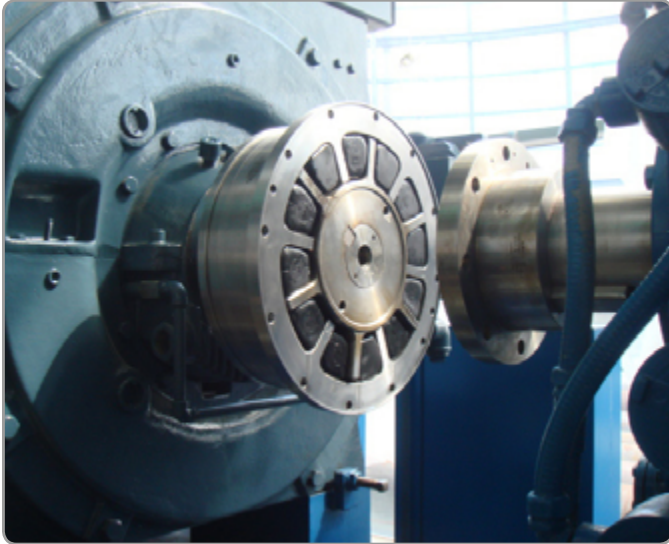
Other available styles include:

ACCR – Spool type coupling allows for greater bore capacity.

ACCL I – Allows introducing oil lubrication at a single end of the coupling.

ACCL II – Allows introducing oil lubrication at each end of coupling.

MAX-C RESILIENT COUPLINGS



KOP-FLEX MAX-C COUPLING ADVANTAGES:

- Transmits very high torque and cushions system shock.
- Never needs lubrication.
- Easy to assemble and install.
- Can increase drive train and gear component life.
- Type "WB" has high shock load capacity
- Type "CB" has large windup capacity

THEORY OF OPERATION

A flexible coupling must perform two tasks: transmit torque from driving to driven shaft and accommodate shaft misalignments—angular, offset and axial. However, many applications require a third function. These applications involve severe torque fluctuations, starting and stopping of high inertia machinery, shock and impact loading and certain other types of torsional vibration problems characteristic of reciprocating equipment. This third function is to provide the proper degree of resilience and damping.

Resilience is the capacity of the coupling to assume relatively large torsional deflections under torque. That is what the MAX-C coupling supplies, a means to attenuate and dampen torsional shock loading and vibration while accommodating misalignment.

COUPLING DESIGN IS THE KEY

Kop-Flex MAX-C couplings employ three principal components: an outer sleeve, an inner flex hub, both made of metal, and resilient drive blocks. When assembled, the flex hub and sleeve form cavities into which specially designed elastomer blocks are placed. The elastomer blocks are incompressible but the pockets allow block deformation under torque; the cavities are completely filled only under conditions of extreme overload and the coupling thus combines high load carrying capability with resilience. This provides smooth power transmission, day after day, year after year, without the coupling ever needing lubrication.

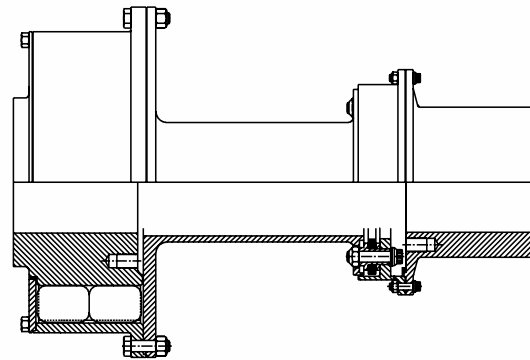
BLOCK MATERIAL

Type WB and CB blocks are supplied in various compounds (natural, nitrile, and SBR high damping rubber) and various hardnesses (40 through 80 Shore 'A' hardness). Since these couplings are designed for engineered applications, the correct block compound and hardness is generally defined by a detailed torsional analysis, or by user experience. Special compounds are also available for specific properties such as high temperature or oil resistant characteristics.

MAX-C RESILIENT COUPLINGS

THE SOLUTION FOR SYNCHRONOUS AND VARIABLE FREQUENCY MOTOR APPLICATION

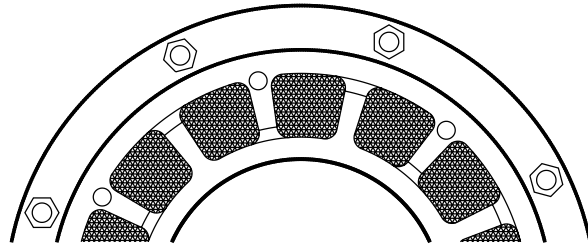
Synchronous motors and variable frequency motor trains can have high vibratory torque. In order to combat and reduce the magnitude of these loads damping can be introduced to the system. High damping SBR rubber loaded in compression, along with the shock load capacity of the "WB" wedge block cavity filling shape is an effective solution. Since the Max-C coupling is much larger in diameter, weighs more, and is costlier than a standard high performance coupling, the solution is to mate the MAX-C half with a standard more economical, lighter weight high performance coupling half (disc diaphragm, or gear). No matter which, Kop-Flex can engineer and manufacture the entire coupling, something no one else in the industry can do.



MAX-C "WB"
Kop-Flex MP Disc Coupling Hybrid

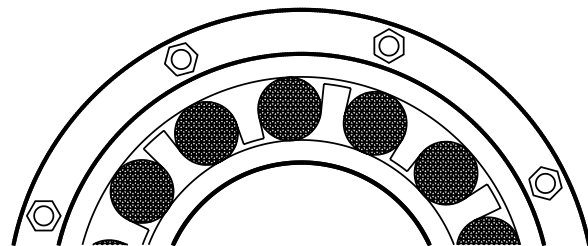
TYPE WB

The MAX-C Type WB should be specified for severe impact or reversing conditions where use of a coupling with moderately high degree of torsional stiffness (a lower degree of angular displacement, varying from 1° to 2° or more) to provide high shock absorbing capacity is required. The high torques at the moment of impact, as well as their possible amplifications at other locations in the drive, usually dictate the use of the Wedge Block MAX-C. The block tends to fill the cavity and the larger driving areas of contact between block and blade will support severe overloads.



TYPE CB

The MAX-C Type CB should be used when resonant vibration conditions, inherent in reciprocating drives, dictate the use of a coupling with very low torsional stiffness (or high degree of angular displacement, approaching 6° or 7° at peak torque), permitting a large windup in relation to the vibratory torque. In the Cylindrical Block MAX-C, there is more space in the cavity or pocket into which the block may deflect under load, producing the high resiliency desired. Even greater resiliency or windup, approaching 14°, can often be achieved with the Type CB to meet specific applications merely by assembling two couplings in tandem.



KOP-FLEX MAX-C® WB COUPLINGS

The Max-C WB is a resilient coupling used to dampen torsional vibrations and severe impact loads. Frequently used on synchronous and variable frequency driven motors driving compressors, ID and FD fans, the Max-C WB is available in a wide range of sizes and torque capacities. Contact Kop-Flex Engineering with specific application information and a custom-engineered and torsionally tuned Max-C can be designed to your requirements.

- Rubber block in wedge shape
- Various compounds and durometers available
- Custom engineered for applications
- High shock absorbing capacity
- Maintenance free operation
- Hybrid designs are available with disc, gear or diaphragm flex elements



SIZE	④ MAX. BORE OF FLEX HUB (in)	PEAK CAPACITY (HP/100 RPM)	PEAK TORQUE (lb - in.) x 10 ³	③ VIBRATORY TORQUE (lb.-in.) x 10 ³	⑥ MAX. SPEED (RPM)	NUMBER OF CAVITIES	② NUMBER OF BLOCK	DIMENSIONS (INCHES)										BOLTS - NO. & DIA. (in)	BOLTS - NO. & DIA. (in)
								A	B	C	D	E	F	G	K①	O	T		
2.5	3	40	25	3.1	4470	12	12	10 1/4	5 5/8	1/8	87/16	2 3/4	4 1/2	9 3/8	2 7/8	4 1/4	3/4	12 - 3/8	6 - 3/8
3	3 1/2	72	46	5.8	3700	12	12	11 5/8	7 1/8	1/8	9 15/16	3 1/2	5 13/16	10 7/8	3 5/8	5 1/4	3/4	12 - 3/8	6 - 3/8
3.5	4 1/4	140	88	11	3250	12	12	14 1/8	8 21/32	5/32	12 1/16	4 1/4	7	13 1/8	5 1/8	5 3/4	3/4	12 - 1/2	6 - 7/16
4	5	200	127	16	2700	12	12	16 3/8	9 21/32	5/32	14 1/4	4 3/4	8 1/8	15 3/8	5 1/8	8	3/4	12 - 1/2	6 - 1/2
4.5	5 1/4	330	210	26	2660	12	12	17 1/4	10 1/16	3/16	15 1/8	4 15/16	8 1/2	16 1/4	7	8	3/4	12 - 1/2	6 - 1/2
5.5	6 7/8	530	330	41	2210	14	14	20 3/4	11 3/8	1/4	18	5 9/16	10	19 1/2	7	10 1/2	7/8	14 - 5/8	7 - 5/8
6	7 7/8	800	500	62	2030	16	16	22 5/8	12 1/2	1/4	19 7/8	6 1/8	12	21 3/8	8	12 1/8	7/8	16 - 5/8	8 - 5/8
6.5	8 1/2	1200	750	94	1840	16	32	24 7/8	15 1/2	1/4	21 5/8	7 5/8	12 5/16	23 3/8	10	13 1/8	1 1/8	16 - 3/4	8 - 3/4
7	9 1/8	1600	1010	126	1710	16	32	26 7/8	17 1/4	1/2	23 1/8	8 3/8	14	25 1/8	6 1/4	14 1/8	1 1/8	16 - 7/8	8 - 3/4
8	10 3/4	2150	1350	170	1560	18	36	29 3/8	18	1/2	25 5/8	8 3/4	14 3/4	27 5/8	6 1/2	16 5/8	1 1/8	18 - 7/8	9 - 3/4
9	11 1/4	2650	1660	210	1470	18	36	31 1/8	20	1/2	26 3/4	9 3/4	16	29 1/8	7 1/4	17 1/2	1 1/8	18 - 1	9 - 3/4
10	13 1/8	3850	2420	300	1320	20	40	34 3/4	21 1/2	1/2	30 1/2	10 1/2	17 15/16	32 3/4	7 3/4	20 1/2	1 1/8	20 - 1	10 - 7/8
11	15	5300	3350	420	1200	20	40	38 1/4	25 1/2	1/2	33 5/8	12 1/2	20	36	9 1/8	23 3/8	1 7/16	20 - 1 1/8	10 - 7/8
12	16	8200	5160	645	1100	22	44	41 3/4	30	1/2	36 1/2	14 3/4	22 3/4	39 1/4	10 3/4	25 1/4	1 1/2	22 - 1 1/4	11 - 1
14	17 5/8	11500	7200	900	1020	24	48	44 3/4	32 3/4	3/4	39 1/2	16	25 1/4	42 1/4	11 7/8	27 3/4	1 1/2	24 - 1 1/4	12 - 1
16	21 1/4	15000	9500	1190	880	24	72	52 1/4	34 1/4	3/4	46	16 3/4	28 13/16	49 1/4	12 3/8	33 1/2	2	24 - 1 1/2	12 - 1 1/8
19	25	27200	17100	2140	750	28	84	61 1/4	40 3/4	3/4	53 3/4	20	35 1/4	57 3/4	14 1/4	39 1/2	2 1/4	28 - 1 3/4	14 - 1 1/4
22	34	45000	28300	3540	580	32	96	79 1/2	49	1	70	24	40	75	14 1/4	54 1/2	2 3/4	32 - 2 1/4	16 - 1 1/2
25	34	67000	42300	5290	580	32	160	79 1/2	58 3/4	1 3/4	70	28 1/2	44 13/16	75	21 1/4	54 1/2	2 3/4	32 - 2 1/4	16 - 1 1/2
28	34	90000	56500	7060	580	32	192	79 1/2	74 1/2	4 1/2	70	35	51 1/4	75	28 1/8	54 1/2	2 3/4	32 - 2 1/4	16 - 1 1/2

① Space needed for block removal

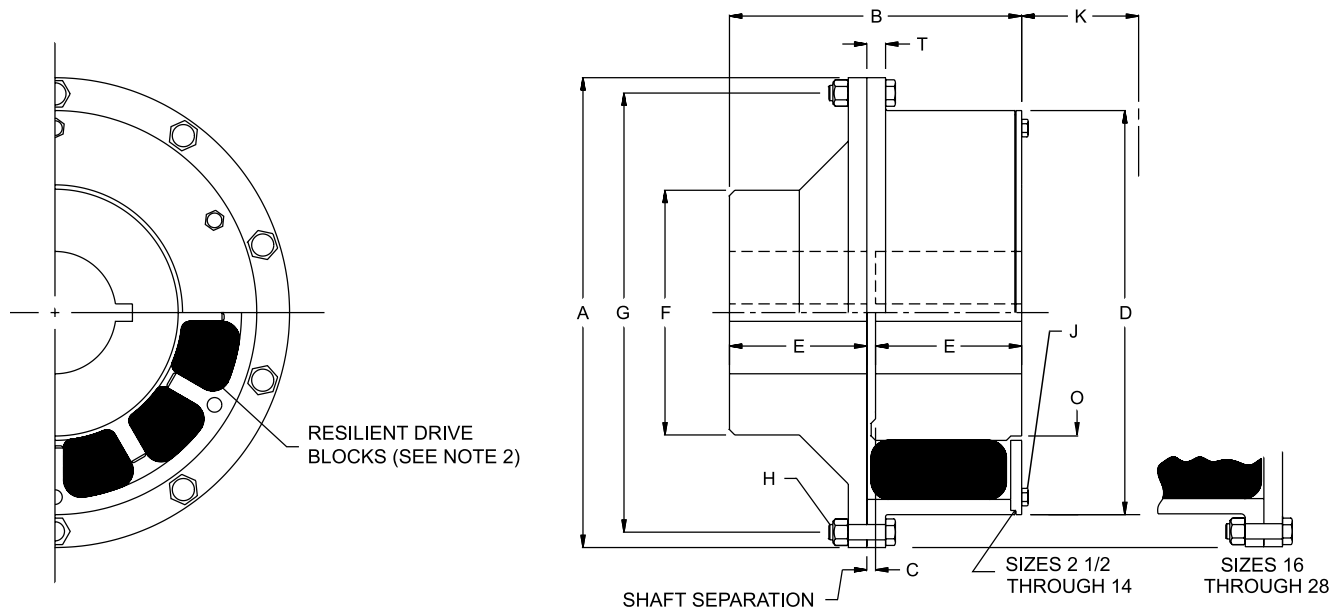
② Number of blocks employed is shown in Tables No. 1 and 2

③ Vibratory torque values tabulated relate to vibration frequencies up to 500 vib/min. For higher frequencies, coupling vibratory torque capacity is derated on the following basis:

$$T_F = T \sqrt{\frac{500}{F}}$$

Where T_F = Vibratory torque capacity (lb. in.) at frequency F (vib/min.).
 T = Vibratory torque (lb. in.) from table.
 F = Frequency (vib/min.) at which torque capacity is required.

KOP-FLEX MAX-C® WB COUPLINGS



SIZE	Ⓒ WR ² W/NO BORES - lb. in. ² x 10 ⁻³					Ⓒ FINISHED WEIGHT W/ NO BORES - lbs.				
	HUB	RESILIENT BLOCKS	SLEEVE & END RING	RIGID HALF	TOTAL	HUB	RESILIENT BLOCKS	SLEEVE & END RING	RIGID HALF	TOTAL
2.5	.052	.016	.275	.239	.582	13	1.5	17	26	58
3	.132	.039	.515	.507	1.19	26	2.7	24	47	99.7
3.5	.346	.124	1.33	1.11	2.91	46	6	43	74	169
4	.921	.248	2.29	2.33	5.79	81	8	51	120	260
4.5	.977	.431	3.66	2.65	7.72	82	13	77	127	299
5.5	2.83	.932	8.44	6.73	18.93	153	19	122	210	504
6	5.38	1.53	12.62	9.96	29.49	224	24	149	276	673
6.5	9.27	2.71	23.4	18.2	53.58	327	38	231	403	999
7	13.81	3.99	32.12	26.33	76.25	424	48	277	507	1256
8	25.35	6.14	44.19	37.17	112.9	593	57	311	628	1589
9	34.12	8.31	60.0	54.7	157.1	727	70	374	810	1981
10	66.3	13.9	104	88.6	272.8	1060	89	510	1075	2734
11	127.1	23.87	169.8	155.8	476.6	1600	127	672	1560	3959
12	209	37.3	280	246	772	2209	162	956	2180	5507
14	331	59.1	390	360	1140	2929	216	1140	2790	7075
16	708	107	986	757	2558	4397	281	1980	4070	10730
19	1640	230	2250	1790	5910	7138	439	3370	6990	17940
22	5390	619	6660	5350	18020	13530	659	5570	12600	32360
25	7650	920	7920	6600	23090	19130	979	6710	15900	42720
28	10000	1220	9180	9520	29920	24620	1300	7840	22200	55960

Ⓓ A reduction in maximum bore is required for limited end float couplings, please consult Kop-Flex.

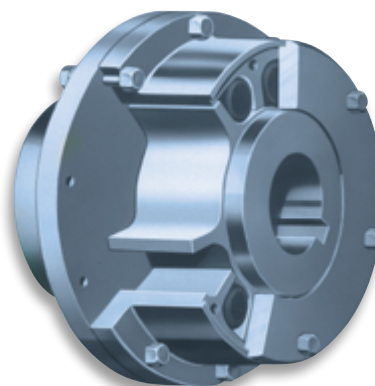
Ⓔ Weight and WR² values are based on ductile iron hubs and sleeves, and steel forged rigids and end rings.

Ⓕ Max. speeds based on ductile iron. Greater speeds allowed for forged steel.

KOP-FLEX MAX-C® CB COUPLINGS

The Max-C CB is a resilient coupling used on reciprocating equipment to isolate damaging vibratory torques from connected equipment. Contact Kop-Flex Engineering with specific application information so a custom-engineered and torsionally tuned Max-C can be designed to your requirements.

- Torsionally soft
- Rubber block in cylindrical shape
- Various compounds and durometers available
- Custom engineered for applications
- Maintenance free operation
- Hybrid designs are available with disc, gear or diaphragm flex elements



SIZE	④ MAX. BORE OF FLEX HUB (in)	PEAK CAPACITY (HP/100 RPM)	PEAK TORQUE (in-lb x10 ³)	③ VIBRATORY TORQUE (in-lb x10 ³)	⑤ MAX. SPEED (RPM)	NUMBER OF CAVITIES	② NUMBER OF BLOCK	DIMENSIONS (in)										BOLTS - No. & DIA. (in)	BOLTS - No. & DIA. (in)	
								A	B	C	D	E	E _r	F	G	K ①	O			T
1.5	1.75	7	4.41	.55	6900	10	10	6.625	4.407	0.0938	5.00	2.156	2.156	4.75	5.875	2.75	2.625	0.75	8 - 0.375	5 - 0.25
2	2.125	12	7.56	.95	5900	10	10	7.75	4.906	0.0938	6.125	2.406	2.406	5.75	7.00	3.00	3.219	0.75	8 - 0.375	5 - 0.313
2.5	2.625	22	13.86	1.73	4800	10	10	9.50	5.375	0.125	7.875	2.625	2.625	6.75	8.75	3.25	3.969	0.75	10 - 0.375	5 - 0.375
3	3.188	40	25.2	3.15	4100	10	10	11.125	6.625	0.125	9.50	3.25	3.25	7.75	10.375	4.25	4.875	0.75	10 - 0.375	5 - 0.438
3.5	3.813	70	44.1	5.51	3600	10	10	13.25	7.875	0.125	11.25	3.875	3.875	10.125	12.25	4.75	5.875	0.75	10 - 0.50	5 - 0.50
4	4.625	120	75.6	9.45	3000	10	10	15.75	9.25	0.125	13.625	4.563	4.563	10.75	14.75	5.75	7.188	0.75	10 - 0.50	5 - 0.625
5	5.625	220	138.6	17.33	2400	10	10	19.125	11.375	0.125	16.50	5.625	5.563	10.00	17.875	7.25	8.781	0.875	10 - 0.625	5 - 0.75
6	6.875	400	252	31.5	1950	10	10	23.50	13.125	0.188	20.25	6.813	6.125	12.00	22.00	8.75	10.625	1.125	10 - 0.75	5 - 0.875
7	7.813	600	378	47.25	1760	10	10	26.125	15.938	0.188	22.875	7.875	7.875	14.00	24.625	10.25	12.125	1.5	12 - 0.75	5 - 0.875
8	8.625	800	504	63.0	1600	10	10	29.00	16.938	0.188	25.375	8.375	8.375	15.25	27.25	11.00	13.563	1.125	16 - 0.875	5 - 1.00
9	9.875	1200	756	94.5	1400	10	10	33.00	19.313	0.188	29.00	9.563	9.563	17.625	31.00	12.75	15.438	1.375	16 - 1.00	5 - 1.125
10	10.875	1600	1008	123.5	1265	10	10	36.25	21.75	0.25	31.50	10.75	10.75	19.25	34.00	14.00	16.813	1.438	16 - 1.125	5 - 1.25
12	12.125	2200	1386	173.3	1150	10	10	40.00	24.00	0.25	35.125	11.875	11.875	21.625	37.50	15.75	18.719	1.75	16 - 1.25	5 - 1.50
13	13.50	3000	1890	236.3	1110	12	24	41.50	28.188	0.313	36.00	13.938	13.938	24.00	39.00	9.75	21.031	1.75	20 - 1.25	6 - 1.25
14	14.75	4000	2520	315.0	1030	12	24	44.50	31.75	0.375	39.375	15.688	15.688	26.00	42.00	11.00	22.906	1.75	20 - 1.25	6 - 1.50
16	16.875	6000	3780	472.5	960	16	32	48.00	36.375	0.375	41.625	18.00	18.00	29.625	45.00	13.00	27.625	2.00	20 - 1.50	8 - 1.125

① Space needed for block removal

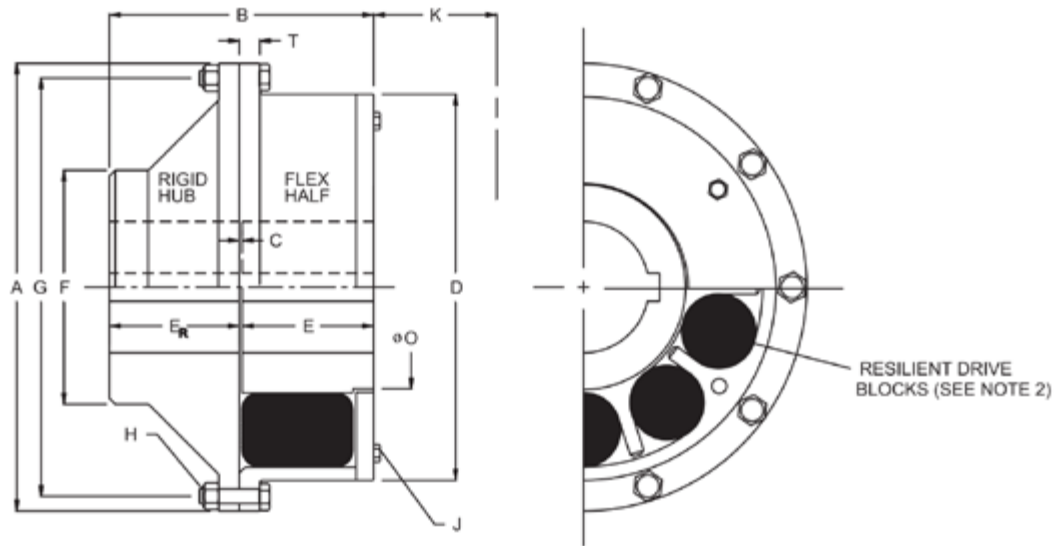
② Number of blocks employed is shown in Tables No. 1 and 2

③ Vibratory torque values tabulated relate to vibration frequencies up to 500 vib/min. For higher frequencies, coupling vibratory torque capacity is derated on the following basis:

$$T_F = T \sqrt{\frac{500}{F}}$$

Where T_F = Vibratory torque capacity (lb. in.) at frequency F (vib/min.).
 T = Vibratory torque (lb. in.) from table.
 F = Frequency (vib/min.) at which torque capacity is required.

KOP-FLEX MAX-C® CB COUPLINGS



SIZE	④ INERTIA W/NO BORES (lb-in ² x 10 ³)					⑤ FINISHED WEIGHT W/ NO BORES (lb)				
	HUB	RESILIENT BLOCKS	SLEEVE & END RING	RIGID HALF	⑥ TOTAL	HUB	RESILIENT BLOCKS	SLEEVE & END RING	RIGID HALF	⑥ TOTAL
1.5	.006	.002	.043	.061	.112	4.4	.47	6.6	14	25.5
2	.013	.004	.086	.126	.229	7.1	.84	10	22	40
2.5	.036	.014	.194	.280	.524	12	1.7	14	34	61.7
3	.091	.037	.481	.572	1.181	22	3	25	54	104
3.5	.223	.089	1.032	1.566	2.910	37	5	38	101	181
4	.577	.222	2.480	2.715	5.994	64	9	64	140	277
5	1.579	.592	5.460	5.545	13.176	117	15	92	198	422
6	4.200	1.627	18.111	12.30	36.24	211	28	210	290	739
7	7.464	3.084	30.39	19.80	60.74	285	42	274	437	1038
8	12.35	5.109	47.31	39.28	104.1	378	56	353	647	1434
9	23.48	9.820	95.76	74.56	203.6	562	83	531	967	2143
10	37.64	15.99	150.2	120.1	323.9	761	113	702	1286	2862
12	63.45	26.96	240.1	205.2	535.6	1036	154	963	1773	3926
13	106.9	39.57	297.3	276.9	720.7	1524	200	1064	2300	5088
14	167.9	55.06	458.5	410.2	1092	2000	234	1361	2978	6573
16	336.1	75.48	516.2	674.5	1602	3063	258	1327	4157	8805

④ A reduction in maximum bore is required for limited end float couplings, please consult Kop-Flex.

⑤ Weight and WR² values are based on ductile iron hubs and sleeves, and steel forged rigids and end rings.

⑥ Max. speeds based on ductile iron. Greater speeds allowed for forged steel.

KD DISC COUPLINGS



KD series of flexible shaft couplings provides reliable transmission of mechanical power from driving to driven machine where a low-maintenance, non-lubricated coupling is required.

KD disc couplings are specifically designed to accommodate general purpose, drive system applications such as centrifugal pumps, compressors, generators.

KD couplings transmit torque and provide for both angular and axial misalignment between shafts with a coupling comprised of shaft mounted hubs connected through flexible disc packs with spacer or sleeve assemblies.

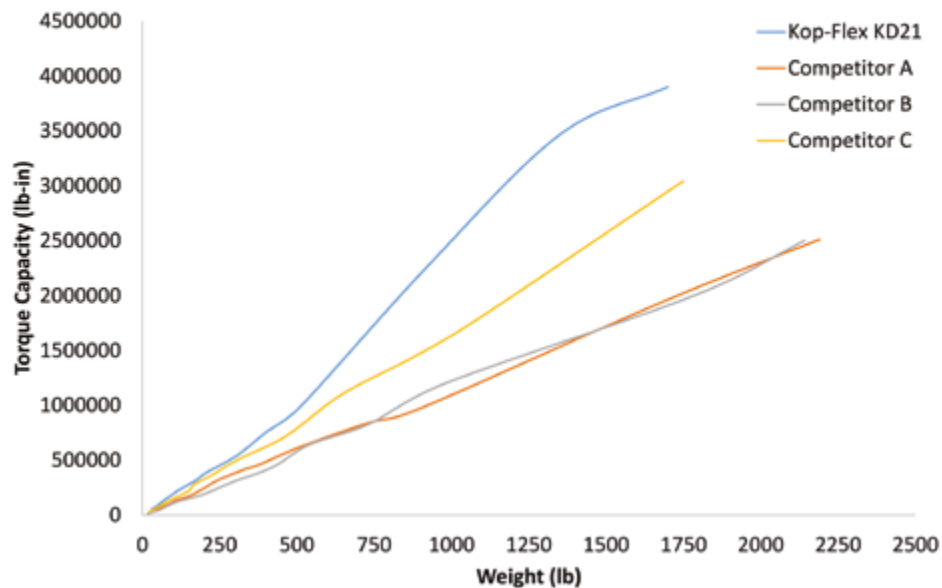
KD disc couplings are now available in an expanded range of sizes and styles suitable for common installations. Or if you need something special, we can design a coupling to meet your specific requirements.

KD PRODUCT LINE OVERVIEW

The KD product line provides a great value. The feature packed KD20, KD21 and KD23 all come standard with the following:

Feature	Benefits
Fully Machined Construction	Improves dynamic stability over cast components
Scalloped Disc Profile	Optimizes stress distribution and reduces reaction loads
Stainless Steel Unitized Disc Pack	Higher strength and facilitates replacement of the flex element
As Machined AGMA Class 9 Balance	Allows for higher operating speeds, Class 10 optional
Forged Steel Components	Allows for smaller, lower weight couplings

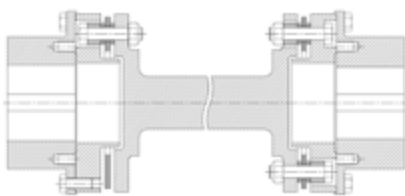
Torque Capacity vs. Weight (Power Density)



These factors combine to provide “best in class” torque capacity by size, allowing for the most power dense coupling selection to be made.

OPTIONAL FEATURES INCLUDE:

Torsionally Tuned Spacer



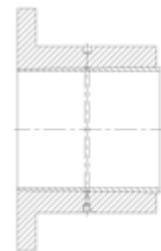
By machining a forging instead of using off the shelf cast components. The stiffness of the spacer can be adjusted to torsionally tune the coupling.

Shrink Disc Mounting



By incorporating a shrink disc mounted on the hub body the coupling can be installed or removed without heating the hubs.

Keyless Tapered Bushing

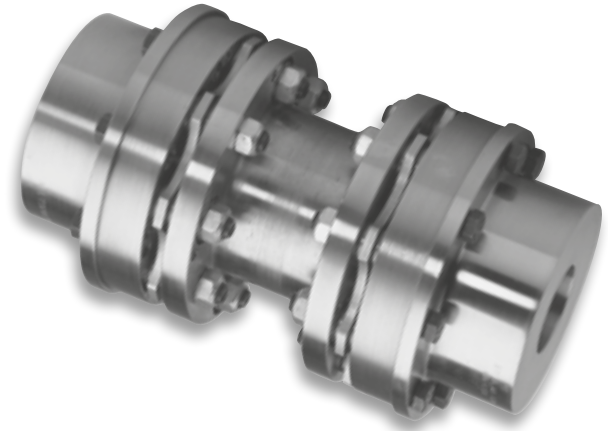


By using a tapered bushing, interference fit hubs can easily be removed through the use of hydraulic fittings and equipment.

KOP-FLEX KD2/KD20 COUPLING

The KD2 and KD20 are user friendly spacer couplings designed to meet API 610 / ISO 13709. The medium duty KD2 and the heavy duty KD20 are for applications requiring moderate shaft separation. Installation and maintenance are simplified by use of only three main parts, two hubs and a factory assembled center section.

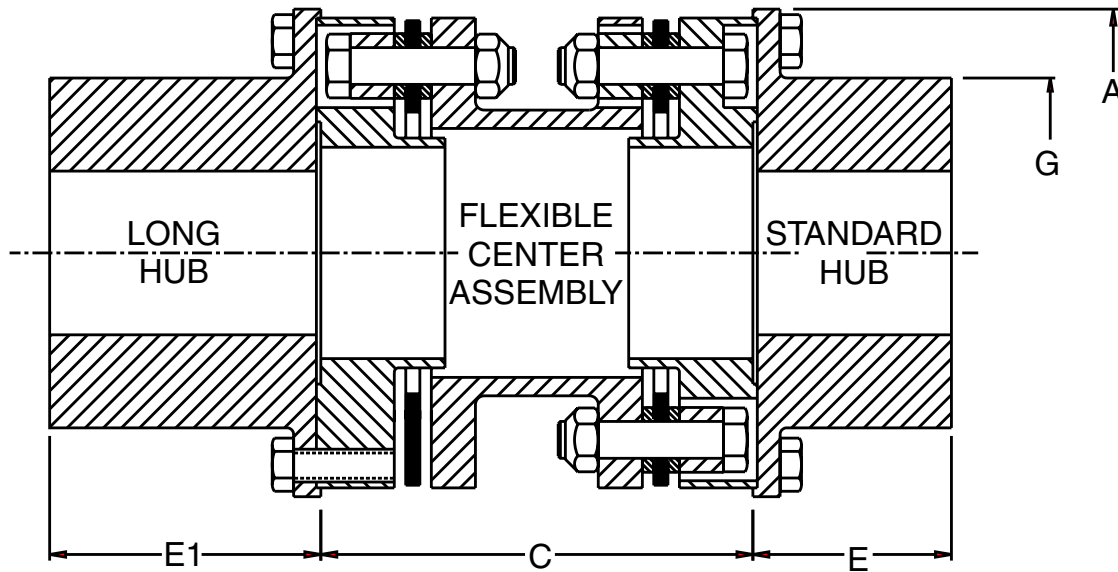
- Drop-out spacer style
- Fully machined steel construction
- AGMA Class 9 Balance standard
- AGMA Class 10 or 11 Balance optional
- Many sizes available to fit your application
- Standard shaft separations for industrial applications
- Many typical center section lengths stocked
- For higher speed applications consider a KS coupling



SIZE	MAXIMUM BORE (in)			TORQUE RATINGS (in-lb)		RATED SPEED (RPM)	TORSIONAL STIFFNESS (in-lb/rad x10 ⁶)		MISALIGNMENT RATINGS		
	KEYED STANDARD HUB	KEYLESS STANDARD HUB (ALLOY)	KEYED JUMBO HUB	MAX. CONTINUOUS	PEAK		K TOTAL	K SPACER PER INCH	AXIAL (in)	ANGULAR (deg)	
KD2	103	1.88	2.00	2.75	2710	5420	17000	1	18	± 0.060	0.50
	153	2.88	3.12	4.00	7880	15760	14200	2	43	± 0.075	0.50
	203	3.25	3.63	4.62	14400	28800	12800	4	68	± 0.090	0.50
KD20	204	3.25	3.50	4.62	54000	72000	4800	4	110	± 0.032	0.25
	254	4.00	4.25	5.62	78000	104000	4200	6	180	± 0.060	0.25
	304	4.75	5.00	6.50	133500	178000	3600	11	360	± 0.047	0.33
	354	5.50	5.75	7.62	225000	300000	3600	18	690	± 0.063	0.33
	404	6.25	6.63	8.75	322500	430000	3000	25	1050	± 0.063	0.33
	454	7.25	7.50	9.38	383000	510000	3000	32	1500	± 0.160	0.33
	504	7.50	7.75	--	540000	720000	2400	43	2500	± 0.067	0.33
	554	8.25	8.50	--	758000	1010000	1800	59	3600	± 0.068	0.33
	604	9.00	9.44	--	990000	1320000	1800	78	4700	± 0.078	0.33
	705	10.88	11.25	--	2265000	3020000	1800	180	14000	± 0.097	0.20
	805	12.25	12.75	--	3465000	4620000	1800	270	21000	± 0.135	0.20
905	13.50	14.00	--	3900000	5200000	1800	330	31000	± 0.228	0.25	

1. Combined coupling ratings are based on simultaneous conditions show. Contact Kop-Flex Engineering for maximum allowable values for your specific application.
 2. Standard keyed bores per ANSI/AGMA 9002. Contact Kop-Flex for other fit requirements
 3. Max. bore for alloy keyless hubs is given for reference only. Contact Kop-Flex Engineering with specific requirements.

KOP-FLEX KD2/KD20 COUPLING



Note: "C" dimension = center assembly length.

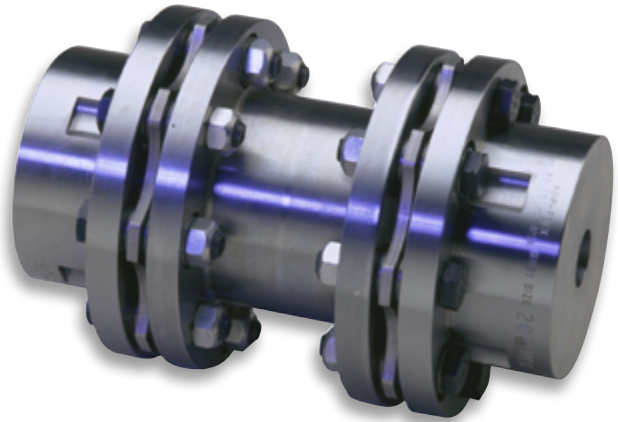
SIZE	DIMENSIONS (in)					WEIGHT - COMPONENT (lb)					INERTIA - COMPONENT (lb-in ²)					
	A	TYPICAL C	E	E1	G	STANDARD HUB "E"	TYPICAL LENGTH CENTER ASSY	LONG HUB "E1"	JUMBO HUB "E1"	SPACER PER INCH	STANDARD HUB "E"	TYPICAL LENGTH CENTER ASSY	LONG HUB "E1"	JUMBO HUB "E1"	SPACER PER INCH	
KD2	103	4.31	5.00	1.50	2.50	2.62	1.7	7.4	2.5	5.9	0.4	3.4	16	4.5	19	0.5
	153	5.69	5.00	2.00	3.12	4.12	4.3	15	6.9	11	0.5	16	60	24	67	1.1
	203	6.75	5.00	2.25	3.62	4.75	7.9	21	12	19	0.6	41	130	56	160	1.7
KD20	204	6.62	7.00	2.25	3.62	4.75	7.4	28	11.0	17.0	0.8	37	170	52	140.0	2.7
	254	7.88	7.00	2.88	4.25	5.75	13	36	18	27	0.8	95	320	130	320	4.4
	304	9.25	9.00	3.38	4.75	6.75	21	64	28	43	1.3	210	780	270	690	8.9
	354	10.75	9.00	4.00	5.38	7.75	32	104	41	65	2.0	430	1700	430	1400	17
	404	12.00	12.00	4.44	6.12	9.00	49	155	65	85	2.4	850	3200	1100	2300	26
	454	13.00	12.00	4.81	6.75	10.12	62	175	83	114	2.5	1300	4350	1750	3700	37
	504	14.12	12.00	6.88	-	10.50	96	226	-	-	3.7	2250	6700	-	-	63
	554	15.38	14.00	7.50	-	11.50	123	317	-	-	4.8	3400	11000	-	-	90
	604	16.88	14.00	8.75	-	12.75	181	403	-	-	5.2	6100	16500	-	-	115
	705	20.88	18.00	9.75	-	15.25	289	799	-	-	11	14000	49000	-	-	350
	805	23.38	20.00	10.75	-	17.25	409	1410	-	-	13	26000	111000	-	-	500
905	25.88	20.00	11.75	-	19.00	538	1550	-	-	14	41000	157000	-	-	770	

4. Additional standard center assembly lengths are available as stock items, custom lengths are also available, contact Kop-Flex for more information.
5. Weight and Inertia are based on max. bore keyed hub, Hub Length "E" and Typical "C" Dimensions
6. Torsional stiffness is based on 1/3 shaft penetration method, max bore keyed hub, hub length "E" and Typical "C" Dimensions.

KOP-FLEX KD21 COUPLING

The KD21 coupling is designed for pump applications with typical shaft separations. The unitized disc packs and close tolerance bolts provide good dynamic balance. The minimal number of components creates an economical disc coupling solution.

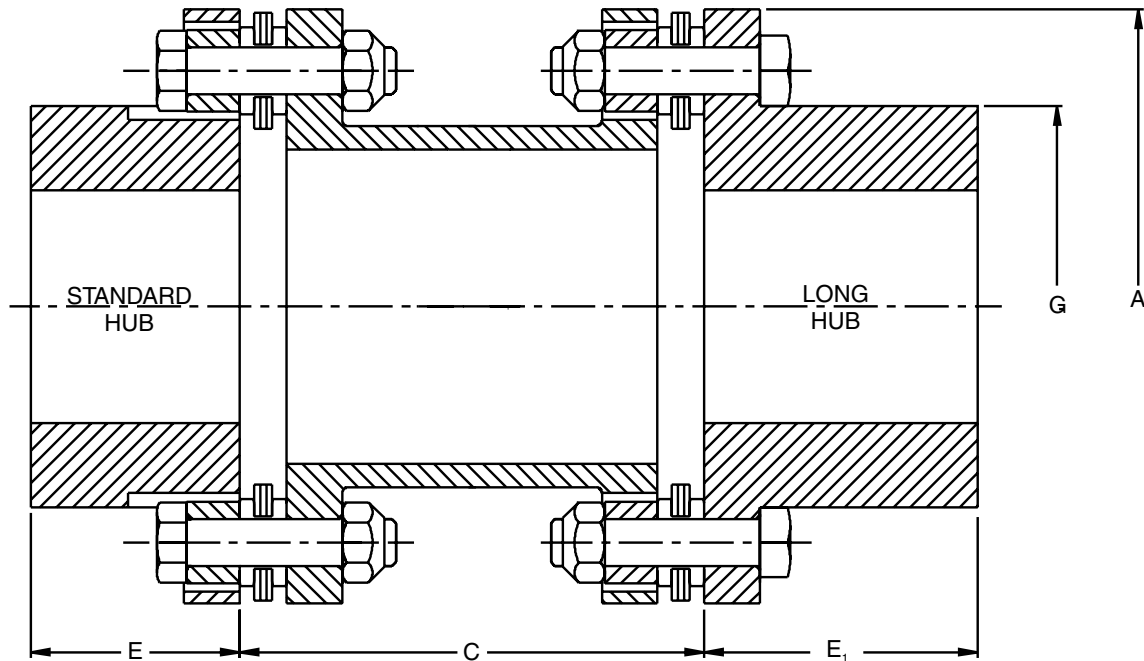
- Economical spacer style
- Fully machined steel construction
- AGMA Class 9 Balance standard
- AGMA Class 10 Balance optional
- Conformance to API 610 / ISO 13701
- Many sizes available to fit your application
- Standard shaft separations for industrial applications
- Many typical center section lengths stocked



SIZE	MAX. BORE (in)		TORQUE RATING (in-lb)		RATED SPEED (RPM)	TORSIONAL STIFFNESS (in-lb/rad x10 ⁶)		MISALIGNMENT RATINGS	
	KEYED HUB	KEYLESS HUB (ALLOY)	MAX CONTINUOUS	PEAK		k TOTAL	k SPACER PER INCH	AXIAL (in)	ANGULAR (deg)
204	3.00	3.25	54000	72000	4800	4	110	± 0.032	0.25
254	3.75	4.00	78000	104000	4200	6	180	± 0.060	0.25
304	4.50	4.75	133500	178000	3600	11	360	± 0.047	0.33
354	5.00	5.38	225000	300000	3600	18	690	± 0.063	0.33
404	5.50	6.13	322500	430000	3000	26	1050	± 0.063	0.33
454	6.38	6.88	383000	510000	3000	33	1500	± 0.160	0.33
504	7.00	7.50	540000	720000	2400	44	2500	± 0.067	0.33
554	7.75	8.13	758000	1010000	1800	60	3600	± 0.068	0.33
604	8.50	8.75	990000	1320000	1800	78	4700	± 0.078	0.33
705	10.75	10.88	2265000	3020000	1800	190	14000	± 0.097	0.20
805	12.00	12.13	3465000	4620000	1800	270	21000	± 0.135	0.20
905	13.50	13.75	3900000	5200000	1800	340	31000	± 0.228	0.25

1. Combined coupling ratings are based on simultaneous conditions shown. Contact Kop-Flex Engineering for maximum allowable values for your specific application.
 2. Standard keyed bores per ANSI/AGMA 9002. Contact Kop-Flex for other fit requirements
 3. Max. bore for alloy keyless hubs is given for reference only. Contact Kop-Flex Engineering with specific requirements.

KOP-FLEX KD21 COUPLING



SIZE	DIMENSIONS (in)					WEIGHT - COMPONENT (lb)						INERTIA - COMPONENT (lb-in ²)					
	A	TYPICAL C	E	E1	G	STANDARD HUB "E"	DRIVE DISC PACK AND FASTENERS	TYPICAL LENGTH SPACER	DRIVEN DISC PACK AND FASTENERS	LONG HUB "E1"	SPACER PER INCH	STANDARD HUB "E"	DRIVE DISC PACK AND FASTENERS	TYPICAL LENGTH SPACER	DRIVEN DISC PACK AND FASTENERS	LONG HUB "E1"	SPACER PER INCH
204	6.38	7.00	2.38	3.03	4.32	7.3	3.1	10	3.1	8.7	0.8	34	20	55	20	39	2.7
254	7.62	7.00	3.00	3.59	5.34	13	3.5	12	3.5	14	0.8	84	32	100	32	94	4.4
304	9.00	7.00	3.56	4.19	6.16	19	6.3	20	6.3	22	1.3	180	79	230	79	200	8.9
354	10.50	7.00	4.12	4.75	6.99	31	11	32	11	34	2.0	380	180	500	180	410	17
404	11.75	8.00	4.62	5.31	7.91	46	17	48	17	51	2.4	720	370	940	370	780	26
454	12.75	8.00	5.25	6.03	8.83	57	19	50	19	64	2.5	1100	470	1200	470	1200	37
504	13.88	10.00	5.88	--	9.62	75	26	73	26	--	3.7	1700	800	2000	800	--	63
554	15.12	10.00	7.16	--	10.48	103	39	97	39	--	4.8	2700	1400	3100	1400	--	90
604	16.50	12.00	7.66	--	11.33	127	50	128	50	--	5.2	4000	2200	4800	2200	--	115
705	20.50	12.00	9.00	--	14.07	220	101	243	101	--	11	11000	6700	13500	6700	--	350
805	23.00	16.00	10.12	--	15.73	312	176	361	176	--	13	19500	15000	25000	15000	--	500
905	25.50	16.00	11.81	--	17.88	463	174	436	174	--	14	35500	18000	40000	18000	--	770

4. Additional standard center assembly lengths are available as stock items, custom lengths are also available, contact Kop-Flex for more information.

5. Weight and Inertia are based on max. bore keyed hub, Hub Length "E" and Typical "C" Dimensions

6. Torsional stiffness is based on 1/3 shaft penetration method, max bore keyed hub, hub length "E" and Typical "C" Dimensions.

KOP-FLEX KD23 COUPLING

The KD23 is a flywheel style coupling, designed for use on reciprocating equipment. The machined plate adapter is designed to connect to standard SAE flywheels.

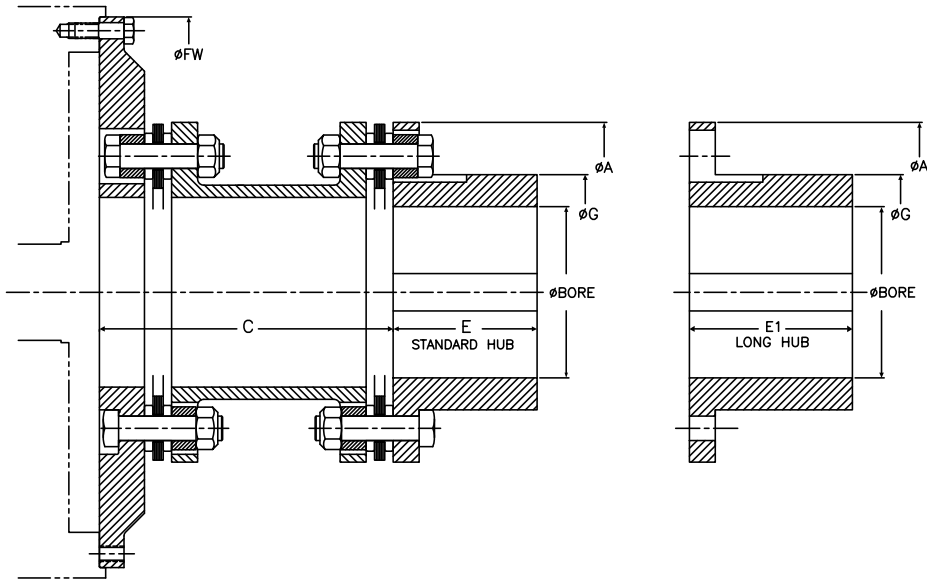
- Flywheel style
- Fully machined steel construction
- AGMA Class 9 Balance standard
- Torque ratings optimized for compression industry
- Many sizes available to fit your application



SIZE	SAE FLY-WHEEL	MAXIMUM BORE (in)		TORQUE RATINGS (in-lb)		RATED SPEED (RPM)	TORSIONAL STIFFNESS (in-lb/RAD) x10 ⁶		MISALIGNMENT CAPACITY		DIMENSIONS (in)					
		KEYED HUB	KEYLESS HUB	MAX CONTINUOUS	PEAK		k TOTAL	k Spacer/in.	AXIAL (in)	ANGULAR (deg)	A	TYPICAL C	E	E1	G	FW
204	8	3.00	3.25	54000	72000	4800	4	110	± 0.032	0.25	6.38	9.00	2.38	3.03	4.32	10.375
254	8	3.75	4.00	78000	104000	4200	6	180	± 0.060	0.25	7.62	9.00	3.00	3.59	5.34	10.375
254	10	3.75	4.00	78000	104000	4200	6	180	± 0.060	0.25	7.62	9.00	3.00	3.59	5.34	12.375
304	10	4.50	4.75	133500	178000	3600	12	360	± 0.047	0.33	9.00	9.00	3.56	4.19	6.16	12.375
304	11 1/2	4.50	4.75	133500	178000	3600	11	360	± 0.047	0.33	9.00	9.00	3.56	4.19	6.16	13.875
354	11 1/2	5.00	5.38	225000	300000	3600	18	690	± 0.063	0.33	10.50	9.00	4.12	4.75	6.99	13.875
354	14	5.00	5.38	225000	300000	3600	18	690	± 0.063	0.33	10.50	9.00	4.12	4.75	6.99	18.375
404	11 1/2	5.50	6.13	322500	430000	3000	27	1050	± 0.063	0.33	11.75	10.00	4.62	5.31	7.91	13.875
404	14	5.50	6.13	322500	430000	3000	27	1050	± 0.063	0.33	11.75	10.00	4.62	5.31	7.91	18.375
404	18	5.50	6.13	322500	430000	3000	27	1050	± 0.063	0.33	11.75	10.00	4.62	5.31	7.91	22.500
454	14	6.38	6.88	383000	510000	3000	34	1500	± 0.160	0.33	12.75	10.00	5.25	6.03	8.83	18.375
454	18	6.38	6.88	383000	510000	3000	34	1500	± 0.160	0.33	12.75	10.00	5.25	6.03	8.83	22.500
504	14	7.00	7.50	540000	720000	2400	47	2500	± 0.067	0.33	13.88	12.00	5.88	--	9.62	18.375
504	18	7.00	7.50	540000	720000	2400	47	2500	± 0.067	0.33	13.88	12.00	5.88	--	9.62	22.500
504	21	7.00	7.50	540000	720000	2400	47	2500	± 0.067	0.33	13.88	12.00	5.88	--	9.62	26.500
554	14	7.75	8.13	758000	1010000	1800	63	3600	± 0.068	0.33	15.12	13.00	7.16	--	10.48	18.375
554	18	7.75	8.13	758000	1010000	1800	63	3600	± 0.068	0.33	15.12	13.00	7.16	--	10.48	22.500
554	21	7.75	8.13	758000	1010000	1800	63	3600	± 0.068	0.33	15.12	13.00	7.16	--	10.48	26.500
554	24	7.75	8.13	758000	1010000	1800	63	3600	± 0.068	0.33	15.12	13.00	7.16	--	10.48	28.875
604	18	8.50	8.75	990000	1320000	1800	82	4700	± 0.078	0.33	16.50	15.00	7.66	--	11.33	22.500
604	21	8.50	8.75	990000	1320000	1800	82	4700	± 0.078	0.33	16.50	15.00	7.66	--	11.33	26.500
604	24	8.50	8.75	990000	1320000	1800	82	4700	± 0.078	0.33	16.50	15.00	7.66	--	11.33	28.875
705	21	10.75	10.88	2265000	3020000	1800	190	14000	± 0.097	0.20	20.50	18.00	9.00	--	14.07	26.500
705	24	10.75	10.88	2265000	3020000	1800	190	14000	± 0.097	0.20	20.50	18.00	9.00	--	14.07	28.875
805	24	12.00	12.13	3465000	4620000	1800	280	21000	± 0.135	0.20	23.00	20.00	10.12	--	15.73	28.875
905	24	13.50	13.75	3900000	5200000	1800	360	31000	± 0.228	0.25	25.50	20.00	11.81	--	17.88	28.875

1. Combined coupling ratings are based on simultaneous conditions show. Contact Kop-Flex Engineering for maximum allowable values for your specific application.
 2. Standard keyed bores per ANSI/AGMA 9002. Contact Kop-Flex for other fit requirements
 3. Max. bore for alloy keyless hubs is given for reference only. Contact Kop-Flex Engineering with specific requirements.

KOP-FLEX KD23 COUPLING



SIZE	WEIGHT - COMPONENT (lb)							INERTIA - COMPONENT (lb-in ²)						
	DRIVEN HUB "E"	DRIVEN HUB "E1"	DRIVE DISC PACK AND FASTENERS	TYPICAL LENGTH SPACER	DRIVEN DISC PACK AND FASTENERS	FLYWHEEL ADAPTER	SPACER PER INCH	DRIVEN HUB "E"	DRIVEN HUB "E1"	DRIVE DISC PACK AND FASTENERS	TYPICAL LENGTH SPACER	DRIVEN DISC PACK AND FASTENERS	FLYWHEEL ADAPTER	SPACER PER INCH
204	7.3	8.7	3.1	11	3.1	15	0.8	34	39	20	57	20	240	2.7
254	13	14	3.5	13	3.5	14	0.8	84	94	32	105	32	2100	4.4
254	13	14	3.5	13	3.5	23	0.8	84	94	32	105	32	530	4.4
304	19	22	6.3	21	6.3	22	1.3	180	200	79	230	79	520	8.9
304	19	22	6.3	21	6.3	32	1.3	180	200	79	230	79	930	8.9
354	31	34	11	33	11	33	2.0	380	410	180	510	180	880	17
354	31	34	11	33	11	75	2.0	380	410	180	510	180	3700	17
404	46	51	17	48	17	32	2.4	720	780	370	950	370	840	26
404	46	51	17	48	17	77	2.4	720	780	370	950	370	3900	26
404	46	51	17	48	17	140	2.4	720	780	370	950	370	10000	26
454	57	64	19	51	19	70	2.5	1100	1200	470	1200	470	3700	37
454	57	64	19	51	19	133	2.5	1100	1200	470	1200	470	10000	37
504	75	-	26	74	26	73	3.7	1700	-	800	2000	800	3500	63
504	75	-	26	74	26	134	3.7	1700	-	800	2000	800	10000	63
504	75	-	26	74	26	206	3.7	1700	-	800	2000	800	22000	63
554	103	-	39	100	39	74	4.8	2700	-	1400	3100	1400	3400	90
554	103	-	39	100	39	141	4.8	2700	-	1400	3100	1400	11000	90
554	103	-	39	100	39	227	4.8	2700	-	1400	3100	1400	24000	90
554	103	-	39	100	39	294	4.8	2700	-	1400	3100	1400	36000	90
604	127	-	50	132	50	135	5.2	4000	-	2200	4900	2200	11000	115
604	127	-	50	132	50	225	5.2	4000	-	2200	4900	2200	24000	115
604	127	-	50	132	50	295	5.2	4000	-	2200	4900	2200	36000	115
705	220	-	101	279	101	236	11	11000	-	6700	15000	6700	22000	350
705	220	-	101	279	101	282	11	11000	-	6700	15000	6700	36000	350
805	312	-	176	371	176	301	13	19500	-	15000	25000	15000	34000	500
905	463	-	174	446	174	266	14	35500	-	18000	40000	18000	31000	770

4. Weight and Inertia are based on max. bore keyed hub, Hub Length "E" and Typical "C" Dimensions

5. Torsional stiffness is based on 1/3 shaft penetration method, max bore keyed hub, hub length "E" and Typical "C" Dimensions.

AUXILIARY ITEMS

KOP-FLEX HYDRAULIC REMOVAL AND INSTALLATION KITS FOR KEYED AND KEYLESS HUBS

WHY DO YOU NEED THIS KIT?

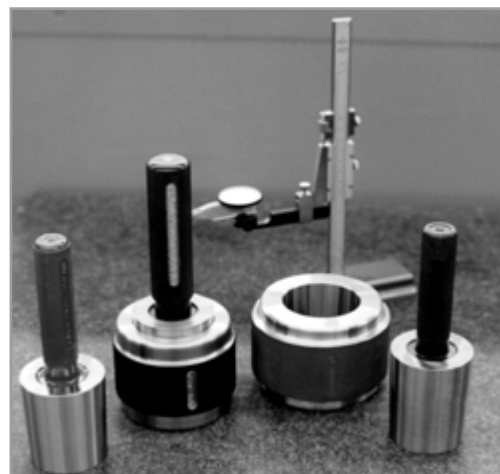
- The use of heat in hub installation and removal is cumbersome
- Time-consuming and sometimes restricted by specific safety codes
- The risk of damaging the coupling parts by overheating is eliminated
- The potential of scoring the bore or the shaft is minimized due to the inherent lubrication of the surfaces in contact
- Maintenance work is simplified. Hydraulic kit is packaged in a durable tool box for safe storage

SYSTEM CAPABILITIES

- Designs for any combination of hub to shaft connections; tapered or straight, single or doubled - keyed
- New applications or retrofits of existing hubs
- No shaft size limitation
- Repeated installation or removal sequences without damage of the contact surfaces
- Standardization of components for minimum inventory

KOP-FLEX CAN ALSO OFFER:

- Matched sets of plug and ring gauges manufactured from heat-treated alloy steel
- Drill templates - when a coupling is used with integral flanged shaft end, a drill template may be required and Kop-Flex can supply a one-time use template or multi-use template
- Two-piece stop rings can be provided to limit and set the advance of the hydraulically fitted coupling hubs during installation



PLUG AND RING GAUGES



This image shows a sheet of white paper with horizontal blue lines. A thick blue diagonal line runs from the top right corner towards the bottom right corner, creating a narrow margin on the right side of the page. The rest of the page is filled with evenly spaced horizontal blue lines, typical of a notebook or a sheet of paper for writing.

This image shows a sheet of white paper with horizontal blue lines. A thick blue diagonal line runs from the top right corner towards the bottom right corner, creating a narrow margin on the right side of the page. The rest of the page is filled with evenly spaced horizontal lines for writing.

All sales are made on our STANDARD TERMS AND CONDITIONS OF SALE in effect at the time a customer's order is accepted. The current Terms and Conditions are set forth below:

STANDARD TERMS AND CONDITIONS OF SALE (February 2015)

These Terms and Conditions, the attendant quotation or acknowledgment and all documents incorporated by specific reference therein, will be the complete and exclusive statement of the terms of the agreement governing the sale of goods ("Goods") by Regal Beloit America Inc. and its divisions and subsidiaries ("Seller") to Customer ("Buyer"). Buyer's acceptance of the Goods will manifest Buyer's assent to these Terms and Conditions. If these Terms and Conditions differ in any way from the terms and conditions of Buyer's order, or other documentation, this document will be construed as a counteroffer and will not be deemed an acceptance of Buyer's terms and conditions which conflict herewith.

- 1. PRICES:** Unless otherwise specified in writing by Seller, Seller's price for the goods shall remain in effect for thirty (30) days after the date of Seller's quotation or acknowledgment of Buyer's order for the Goods, whichever occurs first, provided an unconditional, complete authorization for the immediate shipment of the Goods is received and accepted by Seller within such time period. If such authorization is not received by Seller within such thirty (30) day period, Seller shall have the right to change the price for the Good to Seller's price for the Goods at the time of shipment.
- 2. TAXES:** Any tax or governmental charge or increase in same hereafter becoming effective increasing the cost to Seller of producing, selling or delivering the Goods/provision of Services or of procuring material used therein, and any tax now in effect or increase in same payable by the Seller because of the manufacture, sale or delivery of the Goods/provision of Services, may at Seller's option, be added to the price.
- 3. TERMS OF PAYMENT:** Subject to the approval of Seller's Credit Department, terms are net thirty (30) days from date of Seller's invoice in U.S. currency. If any payment owed to Seller is not paid when due, it shall bear interest, at a rate to be determined by Seller, which shall not exceed the maximum rate permitted by law, from the date on which it is due until it is paid. Seller shall have the right, among other remedies, either to terminate the Agreement or to suspend further performance under this and/or other agreements with Buyer in the event Buyer fails to make any payment when due. Buyer shall be liable for all expenses, including attorneys' fees, relating to the collection of past due amounts.
- 4. SHIPMENT AND DELIVERY:** Shipments are made F.O.B. Seller's shipping point. Any claims for shortages or damages suffered in transit shall be submitted by the Buyer directly to the carrier. While Seller will use all reasonable commercial efforts to maintain the delivery date for the Goods or the date of provision of Services acknowledged or quoted by Seller, all such dates are approximate. Seller reserves the right to make partial shipments and to segregate "specials" and made-to-order Goods from normal stock Goods. Seller shall not be bound to tender delivery of any Goods for which Buyer has not provided shipping instructions.
- 5. QUANTITY:** Buyer agrees to accept overruns of up to ten percent (10%) of the order on "made-to-order" Goods, including parts. Any such additional items shall be priced at the price per item charged for the specific quantity ordered.
- 6. LIMITED WARRANTY:** Subject to the limitations of Section 7, Seller warrants that the Goods will be free from defects in material and workmanship under normal use, service and maintenance and Services will be performed by trained personnel using proper equipment and instrumentation for the particular Service provided. Any licensed firmware embodied in the Goods will execute the programming instructions provided by Seller. The foregoing warranties will apply until the expiration of the applicable warranty period. Except as specified below, Goods are warranted for twelve (12) months (unless otherwise specified by Seller in writing) from the date of shipment of the Goods by Seller. Consumables and Services (except as specified below) are warranted for a period of 90 days from the date of shipment or completion of the Services. Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer. Buyer agrees that Seller has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products. **THIS IS THE SOLE AND EXCLUSIVE WARRANTY GIVEN BY SELLER WITH RESPECT TO THE GOODS/SERVICES AND IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WHETHER OR NOT THE PURPOSE OR USE HAS BEEN DISCLOSED TO SELLER IN SPECIFICATIONS, DRAWINGS OR OTHERWISE, AND WHETHER OR NOT SELLER'S PRODUCTS ARE SPECIFICALLY DESIGNED AND/OR MANUFACTURED BY SELLER FOR BUYER'S USE OR PURPOSE.**

This warranty does not extend to any losses or damages due to misuse, accident, abuse, neglect, normal wear and tear, unauthorized modification or alteration, use beyond rated capacity, or improper installation, maintenance or application. To the extent that Buyer or its agents has supplied specifications, information, representation of operating conditions or other data to Seller in the selection or design of the Goods or provision of Services and the preparation of Seller's quotation, and in the event that actual operating conditions or other conditions differ from those represented by Buyer, any warranties or other provisions contained herein which are affected by such conditions shall be null and void. If within thirty (30) days after Buyer's discovery of any warranty defects within the warranty period, Buyer notifies Seller thereof in writing, Seller shall, at its option, repair, correct, or replace F.O.B. point of manufacture, or refund the purchase price for, that portion of the goods found by Seller to be defective. Failure by Buyer to give such written notice within the applicable time period shall be deemed an absolute and unconditional waiver of Buyer's claim for such defects. Goods repaired or replaced during the warranty period shall be covered by the foregoing warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. Buyer assumes all other responsibility for any loss, damage, or injury to persons or property arising out of, connected with, or resulting from the use of Goods, either alone or in combination with other products/components.

SECTIONS 6 AND 7 APPLY TO ANY ENTITY OR PERSON WHO MAY BUY, ACQUIRE OR USE SELLER'S GOODS, INCLUDING ANY ENTITY OR PERSON WHO BUYS THE GOODS FROM SELLER'S DISTRIBUTOR AND SUCH ENTITY OR PERSON SHALL BE BOUND BY THE LIMITATIONS THEREIN.

7. LIMITATION OF REMEDY AND LIABILITY: THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF ANY WARRANTY HERUNDER (OTHER THAN THE WARRANTY PROVIDED UNDER SECTION 13) SHALL BE LIMITED TO REPAIR, CORRECTION, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE UNDER SECTION 6. SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE AND IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE TO BUYER OF THE SPECIFIC GOODS OR SERVICES PROVIDED BY SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. THE TERM "CONSEQUENTIAL DAMAGES" SHALL INCLUDE, BUT NOT BE LIMITED TO, LOSS OF ANTICIPATED PROFITS, LOSS OF USE, LOSS OF REVENUE, COST OF CAPITAL AND DAMAGE OR LOSS OF OTHER PROPERTY OR EQUIPMENT AND COSTS INCURRED INCLUDING WITHOUT LIMITATION FOR CAPITAL, FUEL AND POWER, AND CLAIMS OF BUYER'S CUSTOMERS. GOODS AND/OR SERVICES SOLD HEREUNDER ARE NOT FOR USE IN ANY NUCLEAR AND RELATED APPLICATIONS. Buyer accepts goods and/or services with the foregoing understanding, agrees to communicate the same in writing to any subsequent purchaser or users and to defend, indemnify and hold harmless Seller from any claims, losses, suits, judgments and damages, including incidental and consequential damages, arising from such use, whether the cause of action be based in tort, contract or otherwise, including allegations that the Seller's liability is based on negligence or strict liability.

8. BUYER RESPONSIBILITIES: Buyer shall provide Seller ready access to the site where services are to be performed and adequate workspace and facilities to perform same as provided in these terms and conditions. Buyer shall not require Seller or its employees, as a condition to site access or otherwise, to further agree or enter into any agreement, which waives, releases, indemnifies or otherwise limits or expands any rights or obligations whatsoever. Any such agreements shall be null and void. Buyer shall inform Seller, in writing, at the time of order placement, of any known hazardous substance or condition at the site, including, but not limited to, the presence of asbestos or asbestos containing materials, and shall provide Seller with any applicable Material Data Safety Sheets regarding same. Buyer shall appoint a representative familiar with the site and the nature of the services to be performed by Seller to be present at all times that Seller personnel are at the site. Seller shall not be liable for any expenses incurred

by Buyer in removing, replacing or refurbishing any Buyer equipment or any part of Buyer's building structure that restricts Seller access. Buyer personnel shall cooperate with and provide all necessary assistance to Seller. Seller shall not be liable or responsible for any work performed by Buyer.

- 9. BUYER SUPPLIED DATA:** To the extent that Seller has relied upon any data or information supplied by Buyer to Seller ("Data") in the selection or design of the Goods and/or provision of the Services and the preparation of Seller's quotation, and the Data is inadequate or inaccurate, any warranties or other provisions contained herein which are affected by such conditions shall be null and void.
- 10. TECHNICAL ADVICE:** It is expressly understood that the Seller assumes no obligation or liability for any technical advice given without charge and furnished by the Seller with respect to the use of the Goods. All such technical advice, or results obtained, is given and accepted at Buyer's risk.
- 11. EXCUSE OF PERFORMANCE:** Seller shall not be liable for delays in performance or for non-performance due to acts of God, acts of Buyer, war, riot, fire, flood, other severe weather, sabotage, or epidemics; strikes or labor disturbances; governmental requests, restrictions, laws, regulations, orders or actions; unavailability of or delays in transportation; default of suppliers; or unforeseen circumstances or any events or causes beyond Seller's reasonable control. Deliveries of Goods or provision of Services may be suspended for an appropriate period of time as a result of the foregoing. If Seller determines that its ability to supply the total demand for the Goods, or to obtain material used directly or indirectly in the manufacture of the Goods, is hindered, limited or made impracticable due to causes addressed in this Section 8, Seller may allocate its available supply of the Goods or such material (without obligation to acquire other supplies of any such Goods or material) among itself and its purchasers on such basis as Seller determines to be equitable without liability for any failure of performance which may result therefrom. Deliveries suspended or not made by reason of this section may be canceled by Seller upon notice to Buyer without liability, but the balance of the agreement shall otherwise remain unaffected.
- 12. CANCELLATIONS AND DELAYS:** The Buyer may cancel orders only upon written notice and upon payment to Seller of cancellation charges which include, among other things, all costs and expenses incurred and commitments made by the Seller and a reasonable profit thereon. Any request by Buyer to extend the delivery schedule must be agreed to in writing by the Seller. If agreement cannot be reached, Seller may deliver product or provide services to the last known ship to address and invoice the Buyer upon completion of the product or services or prior delivery date, whichever is later.
- 13. CHANGES:** Buyer may request changes or additions to the Goods/Services consistent with Seller's specifications and criteria. In the event such changes or additions are accepted by Seller, Seller may revise the price and delivery schedule. Seller reserves the right to change designs and specifications for the Goods or Services without prior notice to Buyer, except with respect to Goods being made-to-order for Buyer. Seller may cancel any order or terminate any agreement without liability to Buyer if Buyer fails to meet the conditions specified herein.
- 14. TOOLING:** Tool, die, and pattern charges, if any, are in addition to the price of the Goods/Services and are due and payable upon completion of the tooling. All such tools, dies and patterns shall be and remain the property of Seller. Charges for tools, dies, and patterns do not convey to Buyer, title, ownership interests in, or rights to possession or removal, nor prevent their use by Seller for other purchasers, except as otherwise expressly provided by Seller and Buyer in writing with reference to this provision.
- 15. SOFTWARE AND FIRMWARE:** Notwithstanding any other provision herein to the contrary, Seller or applicable third party owner shall retain all rights of ownership and title in its respective firmware and software, including all copyrights relating to such firmware and software and all copies of such firmware and software. Except as otherwise provided herein, Buyer is hereby granted a nonexclusive, royalty free license to use firmware and software, and copies of firmware and software, incorporated into the Goods only in conjunction with such Goods and only at the Buyer's plant site where the Goods are first used. Buyer's use of certain firmware (as specified by Seller) and all other software shall be governed exclusively by Seller's and/or third party owner's applicable license terms.
- 16. ASSIGNMENT:** Buyer shall not assign its rights or delegate its duties hereunder or any interest therein or any rights hereunder without the prior written consent of the Seller, and any such assignment, without such consent, shall be void.
- 17. PATENTS AND COPYRIGHTS:** Subject to Section 7, Seller warrants that the Goods and/or Services sold, except as are made specifically for Buyer according to Buyer's specifications, do not infringe any valid U.S. patent or copyright in existence as of the date of delivery. This warranty is given upon the condition that Buyer promptly notify Seller of any claim or suit involving Buyer in which such infringement is alleged, and, that Buyer cooperate fully with Seller and permit Seller to control completely the defense or compromise of any such allegation of infringement. Seller's warranty as to use only applies to infringements arising solely out of the inherent operation (i) of such Goods, or (ii) of any combination of Goods in a system designed by Seller. In the event such Goods and/or Services, singularly or in combination, are held to infringe a U.S. patent or copyright in such suit, and the use of such Goods and/or Services is enjoined, or in the case of a compromise by Seller, Seller shall have the right, at its option and expense, to procure for Buyer the right to continue using such Goods or providing such Services, or replace them with non-infringing Goods or Services; or modify same to become non-infringing; or grant Buyer a credit for the depreciated value of such Goods and accept return of them or grant Buyer a credit for such provided Services.
- 18. EXPORT/IMPORT:** Buyer agrees that all applicable import and export control laws, regulations, orders, and requirements, including without limitation those of the United States and the European Union, and the jurisdictions in which the Seller and the Buyer are established or from which Goods may be supplied, will apply to their receipt and use. In no event shall Buyer use, transfer, release, import, or export Goods in violation of such applicable laws, regulations, orders or requirements.
- 19. HIRING/EMPLOYEES:** Buyer agrees that during the execution of Services by Seller and for a period of twelve (12) months after the performance of Services, it will not hire any employee(s) of Seller and will not entice or counsel any such employee(s) to leave Seller's employ. Buyer agrees that this covenant shall extend to its agents and affiliates. In the event that an employee of Seller is hired or leaves the employ of Seller in such circumstances, Buyer shall pay Seller, as compensation for the cost incurred by Seller in recruiting and training the employee, the sum equivalent to six (6) months pay for each employee hired from or leaving the employment of Seller.
- 20. EMPLOYEE SAFETY AND SUSPENSION OF SERVICES:** Seller may suspend or terminate Services, at its sole discretion, without liability to Buyer if Buyer fails to meet its obligations hereunder or becomes bankrupt or insolvent or if Seller determines that continuing to provide Services represents a hazardous condition for its employees.
- 21. MISCELLANEOUS:** These terms and conditions set forth the entire understanding and agreement between Seller and Buyer, and supersede all other communications, negotiations and prior oral or written statements regarding the subject matter of these terms and conditions. No change, modification, rescission, discharge, abandonment, or waiver of these terms and conditions of Sale shall be binding upon the Seller unless made in writing and signed on its behalf by an officer of the Seller. No conditions, usage or trade, course of dealing or performance, understanding or agreement purporting to modify, vary, explain, or supplement these Terms and Conditions shall be binding unless hereafter made in writing and signed by the party to be bound, and no modification shall be affected by the acceptance of purchase orders or shipping instruction forms containing terms at variance with or in addition to those set forth herein. Any such modifications or additional terms are specifically rejected by Seller. No waiver by Seller with respect to any breach or default or any right or remedy and no course of dealing, shall be deemed to constitute a continuing waiver of any other breach or default or of any other right or remedy, unless such waiver be expressed in writing and signed by the party to be bound. Seller is not responsible for typographical or clerical errors made in any quotation, orders or publications. All such errors are subject to correction. The validity, performance, and all other matters relating to the interpretation and effect of this contract shall be governed by the law of the state of New York. The United Nations Convention on the International Sale of Goods shall not apply to any transaction hereunder.

KOP-FLEX[®]

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APPLICATION CONSIDERATIONS

The proper selection and application of power transmission products and components, including the related area of product safety, is the responsibility of the customer. Operating and performance requirements and potential associated issues will vary appreciably depending upon the use and application of such products and components. The scope of the technical and application information included in this publication is necessarily limited. Unusual operating environments and conditions, lubrication requirements, loading supports, and other factors can materially affect the application and operating results of the products and components and the customer should carefully review its requirements. Any technical advice or review furnished by Regal Beloit America, Inc. and/or its affiliates ("Regal") with respect to the use of products and components is given in good faith and without charge, and Regal assumes no obligation or liability for the advice given, or results obtained, all such advice and review being given and accepted at customer's risk.

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