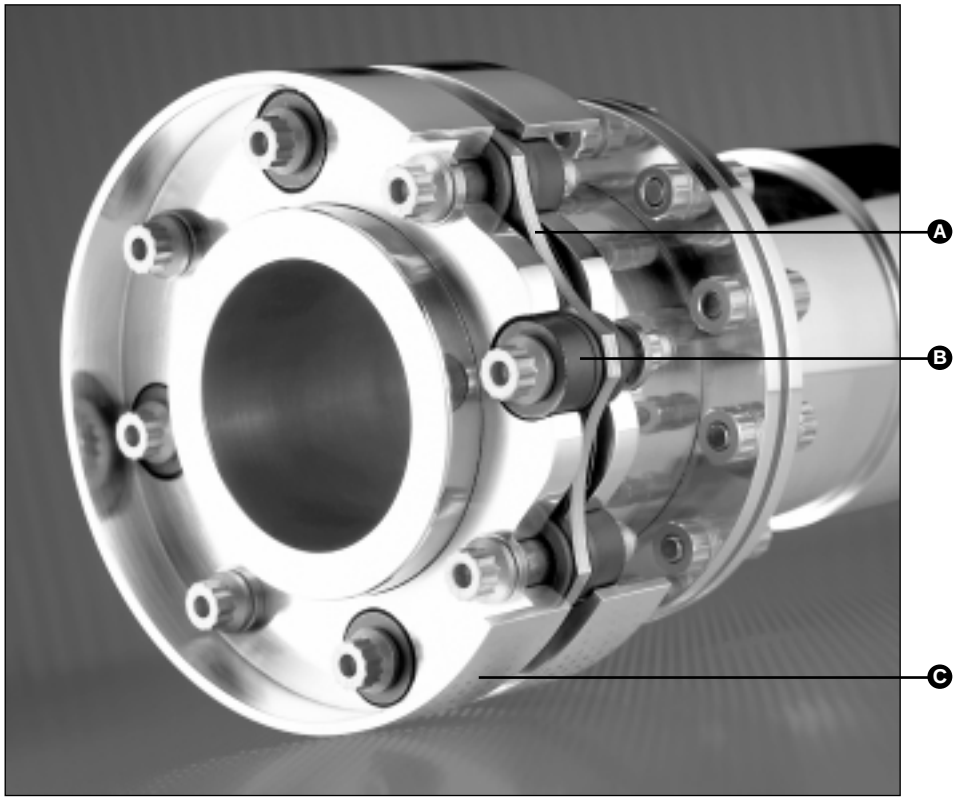
TSGE/TLGE/TTGE

METASTREAM® High Performance Couplings

A – Stainless Steel Flexible Discs
B – Overload Collars
C – Bolt Shrouding



Product Description

Metastream® T-GE Reduced Moment Couplings use two factory assembled hub/disc units and a detachable spacer. This arrangement produces a high integrity coupling suited for most medium speed and high speed compressor drives.

- The factory assembled T-GE hub/flex units are designed to accommodate typical machine shaft sizes for turbo-compressor applications.
- The separate spacer on the T-GE can be varied to provide the appropriate distance between shaft ends and the required torsional stiffness to suit individual applications.
- On some applications, the T-GE hub assembly on a compressor or gearbox input shaft is combined with the flanged T-JE arrangement for a turbine driver.

Design Features

- Reduced Moment Arrangement
- Flexible Discs Visible for Easy Inspection
- Factory Assembled Hub/Flex Element Units
- High Reliability Stainless Steel Flexible Disc Design
- Shrouded Bolts to Reduce Windage
- Built-in Overload Collars for Additional Safety

TSGE/TLGE/TTGE

METASTREAM® High Performance Couplings

TSGE/TLGE/TTGE Technical Data (mm)

Coupling Designation	Rating (kW/rpm)	Peak Torque (kNm)	Max. Speed (rpm)	Coupling Weight (kg)	Coupling Inertia (kg-m²)	Torsional Stiffness (MNm/rad) Qs	Half Coupling C of G (mm) 'G'	Spacer Tube per Meter			Axial Displacement		Angular Misalignment	
								Weight (kg)	Inertia (kg-m²)	Torsional Stiffness (MNm/rad) Qe	Max. per Coupling (±mm)	Equivalent Force (N)	Max. Angle (deg)	Restoring Moment (N-m/deg)
TSGE-0110	0.11	1.40	39,000	4.76	0.006	0.04	25.9	3.67	0.003	0.03	1.1	450	0.375	15
TSGE-0240	0.24	3.06	31,800	7.76	0.014	0.10	38.4	4.78	0.007	0.07	1.7	750	0.375	25
TSGE-0420	0.42	5.34	26,800	11.2	0.030	0.16	36.6	6.07	0.013	0.13	2.2	1,050	0.375	35
TLGE-0600	0.60	7.64	26,800	11.3	0.030	0.20	36.3	6.07	0.013	0.13	1.3	1,180	0.250	40
TSGE-0700	0.70	8.92	22,200	18.0	0.071	0.35	61.5	8.39	0.026	0.26	2.9	1,500	0.375	50
TLGE-1000	1.00	12.74	22,200	18.5	0.071	0.42	61.5	8.39	0.026	0.26	1.8	1,750	0.250	60
TSGE-1100	1.10	14.00	19,400	26.6	0.130	0.49	56.9	11.1	0.043	0.43	3.1	1,350	0.375	60
TLGE-1500	1.50	19.10	19,400	27.3	0.131	0.65	56.9	11.1	0.043	0.43	1.8	1,350	0.250	65
TSGE-1500	1.50	19.10	17,200	39.4	0.245	0.77	66.8	13.9	0.070	0.70	3.7	2,000	0.375	90
TLGE-2100	2.10	26.70	17,200	40.0	0.250	0.92	66.8	13.9	0.070	0.70	2.2	2,250	0.250	95
TSGE-2100	2.10	26.70	15,400	52.6	0.408	1.2	77.0	17.3	0.111	1.11	4.3	2,600	0.375	130
TSGE-2800	2.80	35.70	14,000	64.0	0.601	1.6	92.2	20.7	0.161	1.62	4.8	3,200	0.375	160
TTGE-2800	2.80	35.70	17,200	40.6	0.255	1.0	66.8	13.9	0.070	0.70	1.5	3,350	0.167	190
TLGE-3000	3.00	38.20	15,400	53.5	0.416	1.4	76.7	17.3	0.111	1.11	2.6	3,000	0.250	140
TSGE-3600	3.60	45.80	12,900	82.6	0.917	2.1	105.4	24.5	0.228	2.28	5.4	4,000	0.375	210
TLGE-4000	4.00	51.00	14,000	64.9	0.615	1.9	92.2	20.7	0.161	1.62	3.0	4,000	0.250	240
TTGE-4000	4.00	51.00	15,400	54.4	0.424	1.6	76.7	17.3	0.111	1.11	1.7	4,350	0.167	260
TLGE-5200	5.20	66.20	12,900	83.9	0.936	2.6	105.4	24.5	0.228	2.28	3.4	4,800	0.250	250
TTGE-5200	5.20	66.20	14,000	66.2	0.628	2.2	91.9	20.7	0.161	1.62	2.0	5,800	0.167	325
TLGE-6700	6.70	85.40	11,900	103	1.35	4.6	115.3	28.4	0.324	3.23	3.8	6,200	0.250	330
TTGE-6700	6.70	85.40	12,900	85.3	0.958	2.9	105.2	24.5	0.228	2.28	2.3	8,000	0.167	365
TLGE-8500	8.50	108.20	10,900	140	2.14	4.9	126.2	33.6	0.429	4.29	4.3	7,000	0.250	360
TTGE-8700	8.70	111.80	11,900	104	1.30	5.3	115.1	28.4	0.324	3.23	2.7	12,000	0.167	710
TTGE-9011	11.00	140.00	10,900	142	2.19	5.3	126.2	33.6	0.429	4.29	2.9	15,000	0.167	650
TLGE-9012	12.00	152.80	9,650	194	3.76	6.9	154.2	42.5	0.711	7.12	5.0	9,500	0.250	520
TTGE-9016	16.00	203.80	9,650	196	3.84	8.0	154.2	42.5	0.711	7.12	3.5	19,000	0.167	820
TLGE-9017	17.00	216.00	8,650	284	6.98	11	151.9	56.3	1.12	11.2	5.8	12,000	0.250	670
TTGE-9023	23.00	293.00	8,650	290	7.16	13	151.9	56.3	1.12	11.2	4.0	20,000	0.167	1,150
TLGE-9026	26.00	331.00	7,550	404	12.7	17	165.9	72.2	1.91	19.2	6.9	15,500	0.250	970
TLGE-9034	34.00	433.00	6,900	527	19.5	23	183.1	87.2	2.79	27.9	7.7	19,500	0.250	1,250
TTGE-9034	34.00	433.00	7,550	412	13.0	20	165.9	72.2	1.91	19.2	4.8	23,000	0.167	1,500
TLGE-9042	42.00	535.00	6,350	648	28.1	29	211.3	101	3.68	36.7	8.5	21,000	0.250	1,400
TTGE-9045	45.00	573.00	6,900	538	20.0	27	183.1	87.2	2.79	27.9	5.5	30,000	0.167	1,900
TTGE-9056	56.00	713.00	6,350	660	28.8	35	211.1	101	3.68	36.7	6.1	33,000	0.167	2,200

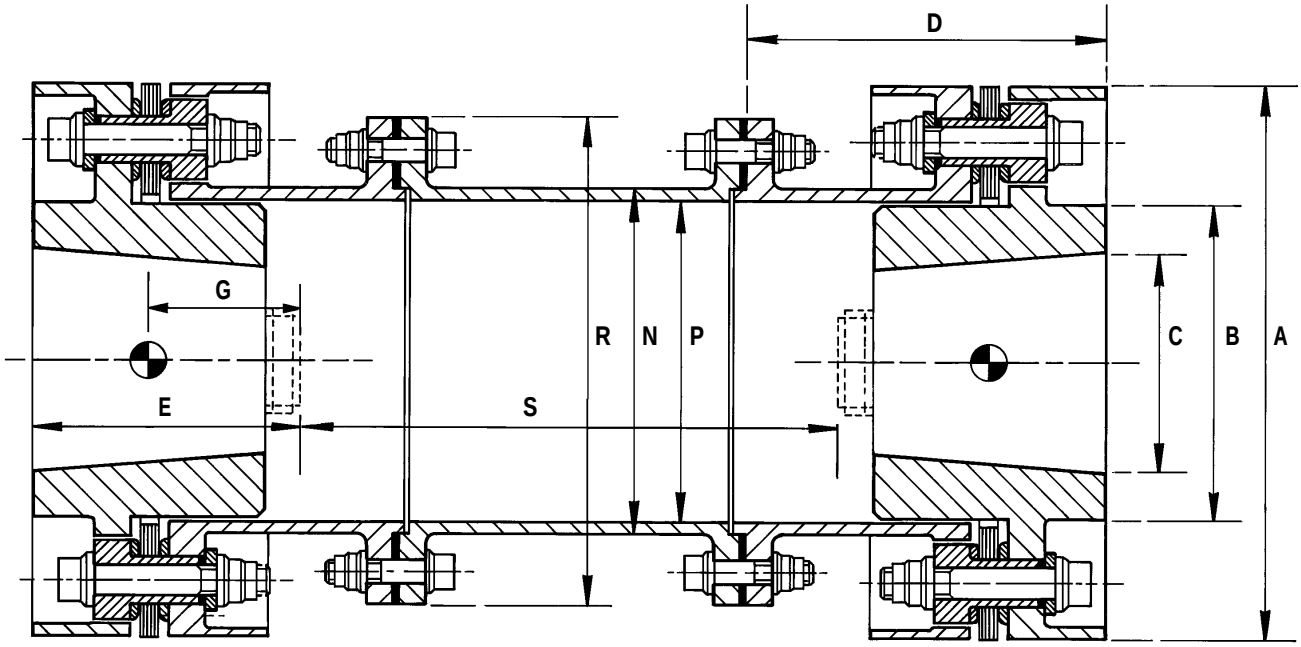
TSGE/TLGE/TTGE Dimensional Data (mm)

Coupling Designation			A	B Max.	C Max.	D	E	N	P	R	S Min.
TSGE	TLGE	TTGE									
110	**—**	**—**	95	56	38	71	45	62	57	95	106
240	**—**	**—**	120	74	51	84	61	80	75	113	112
420	**600**	**—**	144	90	62	90	73	94	89	134	112
700	**1000**	**—**	172	110	76	103	89	114	108	154	120
1100	**1500**	**—**	197	124	86	117	102	128	121	168	129
1500	**2100**	**2800**	222	142	99	135	114	146	138	200	156
2100	**3000**	**4000**	248	160	110	148	127	165	156	219	178
2800	**4000**	**5200**	272	176	121	145	140	181	172	236	156
3600	**5200**	**6700**	297	192	132	157	152	198	188	253	169
—	**6700**	**8700**	324	212	146	167	164	219	208	274	183
—	**8500**	**9011**	348	228	157	178	171	232	220	302	196
—	**9012**	**9016**	390	260	179	197	194	265	252	335	215
—	**9017**	**9023**	438	286	197	239	235	290	274	375	239
—	**9026**	**9034**	500	330	228	267	260	335	317	419	280
—	**9034**	**9045**	544	364	251	285	279	368	348	453	304
—	**9042**	**9056**	590	390	269	296	292	391	370	479	316

TSGE/TLGE/TTGE

METASTREAM® High Performance Couplings

TSGE/TLGE/TTGE Typical Arrangement



NOTES:

1. A minimum application factor of 1.5 is recommended (see Selection Procedure).

2. Technical data based on standard couplings with nominal bore size hubs and 0.457m/18" DBSE (Distance Between Shaft Ends).

3. Maximum angular misalignment is per disc pack. For further information on misalignment capacities, see back page.

4. Torsional Stiffness assumes tapered hydraulic fit hubs including shaft. For other DBSE, stiffness is calculated by:

$$K_{new} = \frac{Ks \; Ke}{L \times Ks + Ke}$$

where L = DBSE - 18"

$$Q_{new} = \frac{Qs \; Qe}{L \times Qs + Qe}$$

where $L = \frac{DBSE - 0.457m}{1{,}000}$

5. Bore capacity and hub lengths are nominal dimensions only. Consult John Crane for specific applications.

6. S dimension is minimum recommended DBSE for installation. Consult John Crane if shorter DBSE is required.

TSGE/TLGE/TTGE

METASTREAM® High Performance Couplings

TSGE/TLGE/TTGE Technical Data (inches)

Coupling Designation	Rating (HP/ 100 rpm)	Peak Torque (in-lb x 10^3)	Max. Speed (rpm)	Coupling Weight (lb)	Coupling Inertia (lb-in^2)	Torsional Stiffness (lb-in/rad x 10^6) Ks	Half Coupling C of G (in) 'G'	Spacer Tube per Inch			Axial Displacement		Angular Misalignment	
								Weight (lb)	Inertia (lb-in^2)	Torsional Stiffness (lb-in/rad x 10^6) Ke	Max. per Coupling (±in)	Equivalent Force (lb)	Max. Angle (deg)	Restoring Moment (lb-in/deg)
TSGE-0110	14.8	12.4	39,000	10.5	19	0.36	1.02	0.21	0.29	11.6	0.043	100	0.375	130
TSGE-0240	32	27.1	31,800	17.1	49	0.88	1.51	0.27	0.63	25.7	0.067	170	0.375	220
TSGE-0420	56	47.3	26,800	24.7	102	1.45	1.44	0.34	1.11	45.0	0.087	240	0.375	310
TLGE-0600	80	67.6	26,800	24.9	102	1.74	1.43	0.34	1.11	45.0	0.051	270	0.250	350
TSGE-0700	94	78.9	22,200	39.7	243	3.06	2.42	0.47	2.25	91.0	0.114	340	0.375	440
TLGE-1000	134	113	22,200	40.7	244	3.71	2.42	0.47	2.25	91.0	0.071	390	0.250	530
TSGE-1100	148	124	19,400	58.7	445	4.35	2.24	0.62	3.72	149	0.122	300	0.375	530
TLGE-1500	201	169	19,400	60.1	448	5.73	2.24	0.62	3.72	149	0.071	300	0.250	580
TSGE-1500	201	169	17,200	86.8	838	6.78	2.63	0.78	6.09	244	0.146	450	0.375	800
TLGE-2100	282	236	17,200	88.2	855	8.18	2.63	0.78	6.09	244	0.087	510	0.250	840
TSGE-2100	282	236	15,400	116	1,394	10.2	3.03	0.97	9.66	386	0.169	590	0.375	1,150
TSGE-2800	375	316	14,000	141	2,054	13.9	3.63	1.16	14.0	563	0.189	720	0.375	1,420
TTGE-2800	375	316	17,200	89.6	873	9.13	2.63	0.78	6.09	244	0.059	750	0.167	1,680
TLGE-3000	402	338	15,400	118	1,421	12.4	3.02	0.97	9.66	386	0.102	670	0.250	1,240
TSGE-3600	483	405	12,900	182	3,132	18.4	4.15	1.37	19.8	794	0.213	900	0.375	1,860
TLGE-4000	536	451	14,000	143	2,101	17.0	3.63	1.16	14.0	563	0.118	900	0.250	2,120
TTGE-4000	536	451	15,400	120	1,449	13.9	3.02	0.97	9.66	386	0.067	980	0.167	2,300
TLGE-5200	697	586	12,900	185	3,199	22.6	4.15	1.37	19.8	794	0.134	1,080	0.250	2,210
TTGE-5200	697	586	14,000	146	2,145	19.3	3.62	1.16	14.0	563	0.079	1,300	0.167	2,880
TLGE-6700	898	756	11,900	226	4,620	40.5	4.54	1.59	28.1	1,126	0.150	1,400	0.250	2,940
TTGE-6700	898	756	12,900	188	3,274	25.7	4.14	1.37	19.8	794	0.091	1,800	0.167	3,230
TLGE-8500	1,140	958	10,900	308	7,317	43.5	4.97	1.88	37.2	1,496	0.169	1,600	0.250	3,190
TTGE-8700	1,167	981	11,900	229	4,444	46.9	4.53	1.59	28.1	1,126	0.106	2,700	0.167	6,260
TTGE-9011	1,475	1,239	10,900	313	7,469	47.3	4.97	1.88	37.2	1,496	0.114	3,400	0.167	5,750
TLGE-9012	1,609	1,352	9,650	427	12,856	61.2	6.07	2.38	61.7	2,481	0.197	2,100	0.250	4,600
TTGE-9016	2,146	1,804	9,650	433	13,105	71.2	6.07	2.38	61.7	2,481	0.138	4,300	0.167	7,260
TLGE-9017	2,280	1,912	8,650	626	23,855	98	5.98	3.15	97.2	3,903	0.228	2,700	0.250	5,930
TTGE-9023	3,084	2,593	8,650	639	24,468	116	5.98	3.15	97.2	3,903	0.157	4,500	0.167	10,200
TLGE-9026	3,487	2,930	7,550	890	43,416	147	6.53	4.04	166	6,687	0.272	3,500	0.250	8,590
TLGE-9034	4,559	3,832	6,900	1,161	66,627	202	7.21	4.88	242	9,732	0.303	4,400	0.250	11,100
TTGE-9034	4,559	3,832	7,550	908	44,528	174	6.53	4.04	166	6,687	0.189	5,200	0.167	13,300
TLGE-9042	5,632	4,735	6,350	1,429	96,123	258	8.32	5.67	319	12,799	0.335	4,700	0.250	12,400
TTGE-9045	6,035	5,071	6,900	1,185	68,440	242	7.21	4.88	242	9,732	0.217	6,700	0.167	16,800
TTGE-9056	7,510	6,311	6,350	1,456	98,440	311	8.31	5.67	319	12,799	0.240	7,400	0.167	19,500

TSGE/TLGE/TTGE Dimensional Data (inches)

Coupling Designation											
TSGE	TLGE	TTGE	A	B Max.	C Max.	D	E	N	P	R	S Min.
110	**—**	**—**	3.74	2.20	1.50	2.80	1.75	2.44	2.24	3.74	4.18
240	**—**	**—**	4.72	2.91	2.00	3.31	2.38	3.15	2.95	4.45	4.38
420	**600**	**—**	5.67	3.54	2.44	3.53	2.88	3.71	3.50	5.28	4.38
700	**1000**	**—**	6.77	4.33	3.00	4.04	3.50	4.49	4.25	6.06	4.69
1100	**1500**	**—**	7.76	4.88	3.38	4.60	4.00	5.04	4.76	6.61	5.06
1500	**2100**	**2800**	8.74	5.59	3.88	5.30	4.50	5.74	5.43	7.87	6.12
2100	**3000**	**4000**	9.76	6.30	4.25	5.81	5.00	6.48	6.14	8.62	7.00
2800	**4000**	**5200**	10.71	6.93	4.75	5.69	5.50	7.14	6.77	9.29	6.12
3600	**5200**	**6700**	11.69	7.56	5.12	6.17	6.00	7.80	7.40	9.96	6.62
—	**6700**	**8700**	12.76	8.35	5.75	6.57	6.44	8.61	8.19	10.79	7.19
—	**8500**	**9011**	13.70	8.98	6.12	7.00	6.75	9.13	8.66	11.89	7.69
—	**9012**	**9016**	15.35	10.24	7.00	7.75	7.62	10.44	9.92	13.19	8.44
—	**9017**	**9023**	17.24	11.26	7.75	9.40	9.25	11.42	10.79	14.76	9.38
—	**9026**	**9034**	19.69	12.99	9.00	10.50	10.25	13.18	12.48	16.50	11.00
—	**9034**	**9045**	21.42	14.33	9.88	11.20	11.00	14.47	13.70	17.83	11.94
—	**9042**	**9056**	23.23	15.35	10.50	11.70	11.50	15.41	14.57	18.85	12.44

CUT LINE FOR SHORT PAGE

TSGE/TLGE/TTGE

METASTREAM® High Performance Couplings

Selection Procedure

1. For proper selection, the following data should be obtained:

- Maximum Continuous Power (HP horsepower)
- Speed (N rpm)
- Peak Torque (short circuit/overload)
- Maximum Speed
- Distance Between Shaft Ends (DBSE)
- Driver Shaft Diameter
- Driven Shaft Diameter
- Maximum Axial Displacements
- Maximum Parallel Shaft Offset or Angular Alignment

2. Calculate minimum coupling rating required using the appropriate application factor F.
NOTE: Minimum application factor of 1.5 is recommended.

3. Minimum Required Coupling Rating $= \left(\frac{kW \times F}{N} \right)$ kW per rpm $= \left(\frac{100 \times HP \times F}{N} \right)$ HP per 100 rpm

4. Select coupling size from tables provided.

5. Check maximum hub bores will accommodate shaft sizes.

6. Check maximum speed, misalignment, and peak torque capacities are adequate.

Example: Turbine to Compressor - API 671 required. Axial displacement specified ±2.03mm/0.080" min.

Max. Continuous Duty - 9,000 kW/12,000 HP at 8,000 rpm

Turbine Shaft - 89mm/3.5" tapered hydraulic fit

Compressor Shaft - 83mm/3.25" tapered hydraulic fit

DBSE (API 671) - 457mm/18"

Minimum Rating Required for API 671 $= \frac{9{,}000 \times 1.5}{8{,}000}$ $= \frac{100 \times 12{,}000 \times 1.50}{8{,}000}$

$= 1.688$ kW per rpm $= 225$ HP per 100 rpm

Selection: Metastream TLGE - 2100
Giving - Angular misalignment of ±1/4˚ per disc pack. Axial displacement of ±2.21mm/0.087".

Application Factor F

For smooth power driving machines (turbines, motors).

- Constant Torque 1.50
  (Centrifugal Compressors, Feed Pumps, etc.)
- API 671 . . . . . .1.50
- Moderate Torque Fluctuations 2.00
  (Fans, Screw Compressors, etc.)

For Turbine/Generator drives, check peak torque capacity.

For synchronous motor drives or other applications where significant torque fluctuations or oscillations occur, consult John Crane.

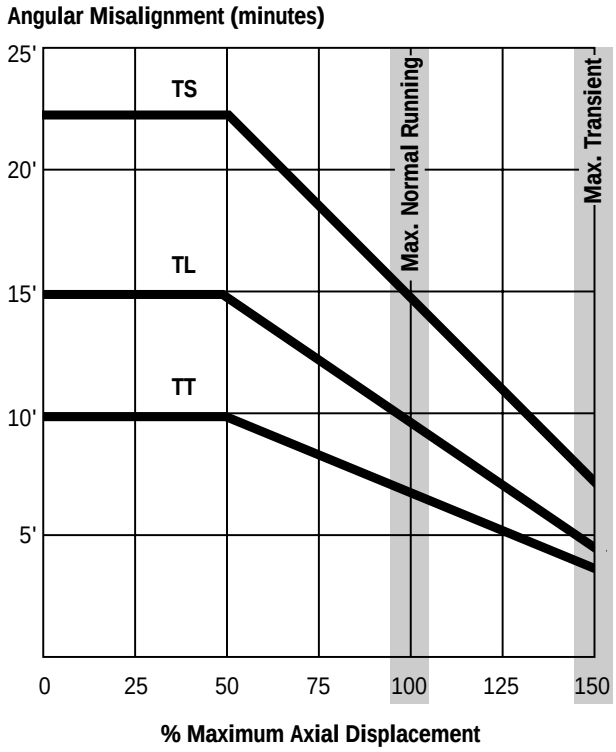
CUT LINE FOR SHORT PAGE

TSGE/TLGE/TTGE

METASTREAM® High Performance Couplings

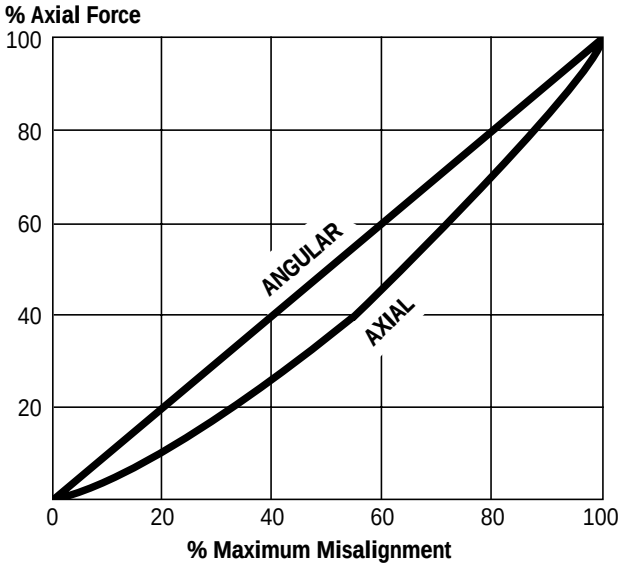
Angular Misalignment vs. Axial Displacement

Axial and angular misalignment have a combined effect on the flexible membrane stresses. Therefore, a reduction in one permits an increase in the other. The trade off is shown in the graph opposite. Transient or short term misalignment limits are also shown in this graph, and are usually applicable to the high thermal growths often caused during startup and shutdown of turbine drives. A detailed review of a coupling selection may require consideration of the relative casing and shaft expansions on such applications. Couplings can often be installed with axial pre-stretch to allow their continuous operation at lower displacements.



Restoring Force vs. Displacement

The axial and angular restoring forces can be calculated from the data given in the tables and the graph opposite. The axial load characteristic makes the Metastream coupling resistant to axial resonance. The nonlinear characteristic detunes the system, preventing high amplitudes of vibration. John Crane can provide full details of the axial response curves upon request.



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