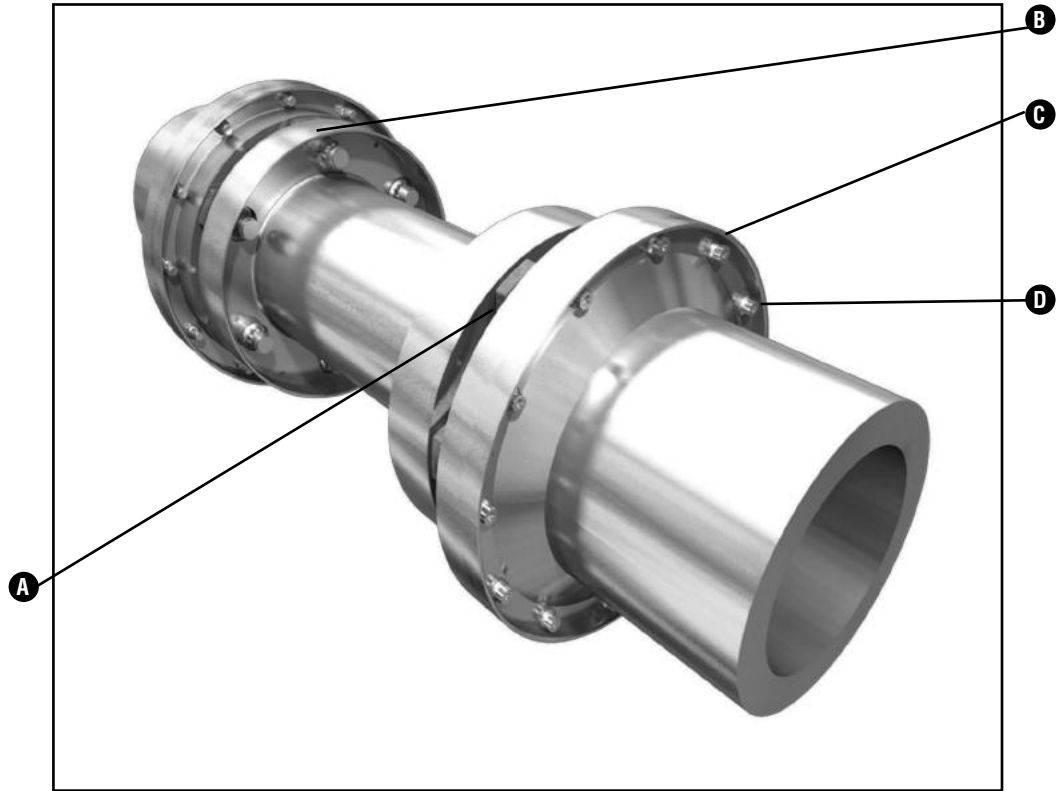


TYPE HSFE/HLFE/HTFE

H SERIES HIGH PERFORMANCE COUPLINGS

Technical Specification

- A** – High Strength Stainless Steel Flexible Membranes
- B** – Overload Collars
- C** – Flanged Connections
- D** – Shrouded bolts



Product Description

John Crane's HSFE/HLFE/HTFE Couplings feature a factory assembled transmission unit, providing high torque capacity with low weight. The hub bores possible with the design make this range particularly suitable for use on electric motor or generator drive applications, where larger shaft sizes are generally in use.

- The flanged HSFE/HLFE/HTFE transmission unit can be readily adapted to match the integral shaft flanges used on many large gas and steam turbines
- On some applications, a HSFE/HLFE/HTFE turbine end drive is combined with a reduced moment arrangement at the compressor end
- The transmission unit is simple to install and remove for rapid separation of the two machines, providing easy access for alignment and equipment maintenance

Design Features

- Large hub bore capacity
- Factory assembled transmission unit
- High reliability stainless steel flexible membrane design
- Shrouded bolts to reduce windage
- Built-in overload collars for additional safety
- Axial shims for length adjustment when required

TYPE HSFE/HLFE/HTFE

H SERIES HIGH PERFORMANCE COUPLINGS

Technical Specification

HSFE/HLFE/HTFE Technical Data (metric)

					Note 2								Axial Misalignment		Note 4	
					Weights		Moment of Inertia WR ²		Note 3							
Coupling Designation	Coupling Rating	Continuous Torque Rating	Peak Torque Rating	Max. Speed	Transmission Unit	Additional Spacer Length	Transmission Unit only	Additional Spacer Length	Membrane pack	Transmission Unit	Spacer Tube		Maximum per Coupling	Equivalent Axial Force	Max Angle	Restoring Moment
									q1	q2	Per metre q3	T				
		kW/1000 rpm	Nm	Nm	rpm	kg	kg/m	kgm²	kgm²/m	MNm/rad	MNm/rad	MNm/rad	mm	± mm	N	Deg
HSFE-0074	129	1229	2090	28300	3.6	3.2	0.005	0.002	0.37	0.05	0.02	70	1.4	800	0.375	20
HSFE-0096	271	2586	4400	23500	5.5	4.3	0.013	0.005	0.73	0.1	0.05	81	1.8	1200	0.375	30
HSFE-0115	466	4453	7570	20000	8.4	6.3	0.028	0.011	1.3	0.21	0.12	90	2.2	1790	0.375	45
HSFE-0139	795	7590	12900	17300	12.6	8.9	0.060	0.024	2.2	0.43	0.25	102	2.7	2500	0.375	80
HSFE-0159	1188	11350	19300	14900	17.9	10.3	0.117	0.037	3.5	0.69	0.39	119	3.1	3180	0.375	125
HSFE-0179	1694	16182	27500	13200	24.4	13.3	0.204	0.061	5.1	1.1	0.63	133	3.5	4110	0.375	180
HSFE-0200	2350	22447	38200	12000	31.8	16.8	0.328	0.097	6.9	1.7	1.01	148	3.9	4960	0.375	270
HSFE-0220	3128	29877	50800	10600	42.2	20.7	0.541	0.147	9.4	2.4	1.53	149	4.3	6110	0.375	350
HSFE-0240	4062	38788	65900	9800	51.2	22.6	0.777	0.189	11.9	3.1	1.98	161	4.6	7150	0.375	450
HSFE-0262	5244	50077	85100	9100	65	27.2	1.17	0.274	16	4.5	2.86	176	5.1	8780	0.375	590
HSFE-0283	6589	62921	107000	8400	79	31.9	1.63	0.368	19.7	5.8	3.84	186	5.5	10000	0.375	740
HSFE-0320	9627	91942	156300	7600	106	42.2	2.75	0.628	28.2	9.1	6.56	207	6.3	12700	0.375	1050
HSFE-0357	13480	128737	218900	6700	151	50.5	5.06	0.938	39.8	13.7	9.78	239	6.9	16080	0.375	1430
HSFE-0409	20151	192439	327100	6000	214	65.8	9.28	1.62	60.1	21.9	16.9	272	8	21160	0.375	2100
HSFE-0449	26654	254547	432700	5500	261	81.1	13.34	2.42	77.9	29.0	25.3	290	8.7	25020	0.375	2600
HSFE-0485	33173	316802	538600	5000	333	92.4	20.07	3.23	99.5	37.5	33.7	312	9.5	29550	0.375	3150
HLFE-0115	663	6335	10770	20000	9.1	8.5	0.029	0.016	1.5	0.28	0.16	90	1.5	2150	0.25	85
HLFE-0139	1131	10797	18360	17300	13.4	11.6	0.061	0.032	2.6	0.54	0.33	102	1.9	3000	0.25	150
HLFE-0159	1691	16146	27450	14900	19.2	14.9	0.12	0.055	4	0.91	0.57	119	2.1	3800	0.25	240
HLFE-0179	2411	23022	39100	13200	25.8	18.5	0.207	0.087	5.9	1.4	0.9	133	2.4	4930	0.25	350
HLFE-0200	3344	31933	54300	12000	33.2	22.7	0.332	0.133	7.9	2.1	1.39	148	2.6	5960	0.25	530
HLFE-0220	4451	42503	72300	10600	43.7	27.2	0.543	0.196	10.8	3	2.04	149	2.9	7340	0.25	700
HLFE-0240	5778	55181	93800	9800	53.4	32.0	0.783	0.274	13.6	4	2.86	161	3.2	8580	0.25	880
HLFE-0262	7460	71241	121100	9100	66.9	37.5	1.17	0.385	18.4	5.6	4.02	176	3.5	10530	0.25	1150
HLFE-0283	9373	89513	152200	8400	81.8	45.7	1.64	0.541	22.6	7.3	5.64	186	3.8	12000	0.25	1450
HLFE-0320	13696	130799	222400	7600	109	57.8	2.74	0.88	32.4	11.2	9.18	207	4.3	15250	0.25	2100
HLFE-0357	19177	183145	311300	6700	153	71.4	5.02	1.36	45.7	16.8	14.2	239	4.7	19300	0.25	2800
HLFE-0409	28667	273770	465400	6000	218	93.9	9.27	2.36	69	26.7	24.7	272	5.5	25400	0.25	4100
HLFE-0449	37919	362127	615600	5500	269	112	13.47	3.42	89.5	35	35.6	290	6.0	30000	0.25	5100
HLFE-0485	47193	450693	766200	5000	340	131	19.99	4.67	114.2	45.4	48.8	312	6.6	35450	0.25	6200
HTFE-0179	3101	29618	50400	13200	27.6	23.9	0.218	0.114	10.7	2.2	1.19	133	1.7	6850	0.167	720
HTFE-0200	4302	41083	69,800	12000	35.2	28.6	0.346	0.171	14.3	3.2	1.79	148	1.9	8270	0.167	1100
HTFE-0220	5726	54682	93,000	10600	46.7	36	0.57	0.265	19.5	4.7	2.77	149	2.1	10200	0.167	1400
HTFE-0240	7434	70992	120700	9800	56.7	41.6	0.819	0.364	24.7	6.3	3.80	161	2.3	11900	0.167	1800
HTFE-0262	9597	91654	155800	9100	70.4	48	1.22	0.503	33.3	8.8	5.24	176	2.5	14630	0.167	2400
HTFE-0283	12059	115161	195800	8400	85.4	56.9	1.7	0.687	40.8	11.5	7.17	186	2.7	16680	0.167	3000
HTFE-0320	17621	168277	286100	7600	114	73.8	2.85	1.15	58.6	18.1	12	207	3.1	21180	0.167	4200
HTFE-0357	24672	235621	400600	6700	159	92.9	5.18	1.80	82.7	27.8	18.8	239	3.3	26800	0.167	5700
HTFE-0409	36881	352212	598800	6000	225	119	9.53	3.04	125	44.2	31.7	272	3.9	35270	0.167	8300
HTFE-0449	48784	465886	792000	5500	278	144	13.9	4.47	162	58.4	46.7	290	4.3	41690	0.167	10350
HTFE-0485	60715	579828	985700	5000	349	165	20.5	6.01	207	75.8	62.7	312	4.7	49230	0.167	12500

TYPE HSFE/HLFE/HTFE

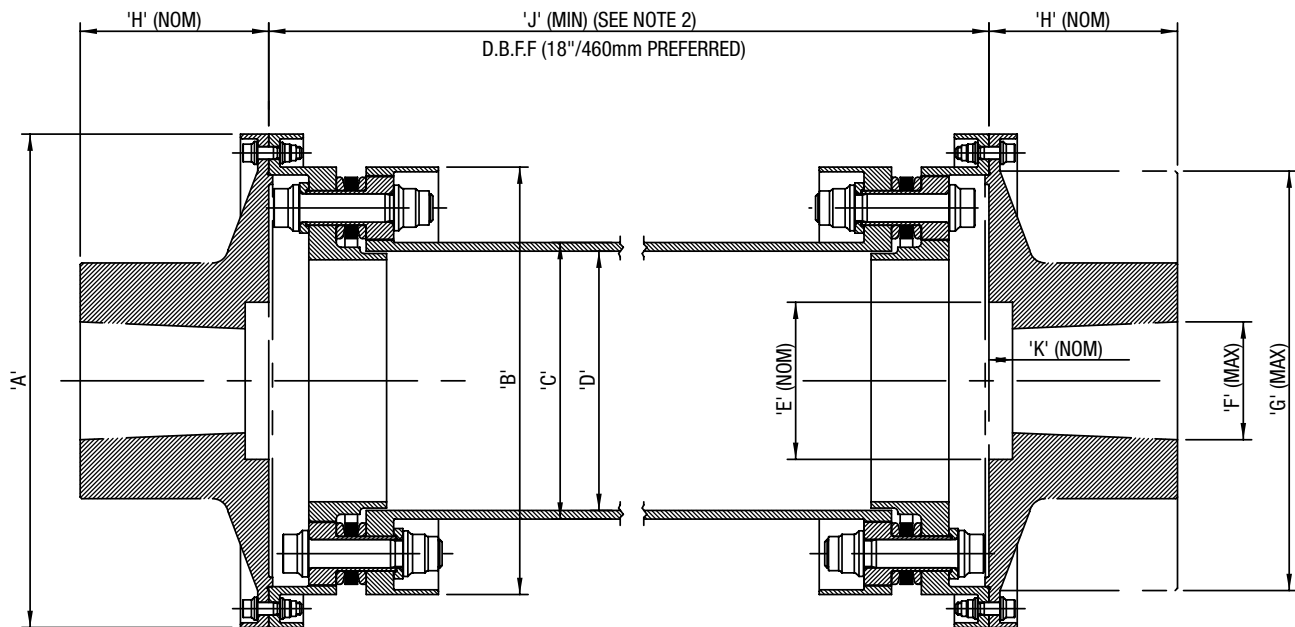
H SERIES HIGH PERFORMANCE COUPLINGS

Technical Specification

HSFE/HLFE/HTFE Dimensional Data (mm)

Coupling Designation			A	B	C	D	E (Nom)	F (Max)	G	H (Nom)	J (Min)	K (Nom)
HSFE-0074			127	95	55	50	82	70	95	63	131	10
HSFE-0096			152	120	72	67	107	90	120	81	147	13
HSFE-0115	HLFE-0115		176	144	88	82	128	110	144	99	156	13
HSFE-0139	HLFE-0139		204	172	107	100	156	130	172	117	187	15
HSFE-0159	HLFE-0159		236	197	123	116	180	150	197	135	208	15
HSFE-0179	HLFE-0179	HTFE-0179	264	222	139	131	204	170	222	153	228	20
HSFE-0200	HLFE-0200	HTFE-0200	289	248	156	147	228	190	248	171	247	25
HSFE-0220	HLFE-0220	HTFE-0220	264	222	142	131	204	210	222	170	228	20
HSFE-0240	HLFE-0240	HTFE-0240	350	297	188	178	275	225	297	203	274	25
HSFE-0262	HLFE-0262	HTFE-0262	377	324	206	195	302	240	324	216	320	25
HSFE-0283	HLFE-0283	HTFE-0283	404	348	221	209	326	260	348	234	331	25
HSFE-0320	HLFE-0320	HTFE-0320	444	390	251	237	366	290	390	261	357	30
HSFE-0357	HLFE-0357	HTFE-0357	506	438	280	265	410	330	438	297	417	35
HSFE-0409	HLFE-0409	HTFE-0409	568	500	322	305	472	370	500	333	481	40
HSFE-0449	HLFE-0449	HTFE-0449	610	544	355	336	514	390	544	351	512	45
HSFE-0485	HLFE-0485	HTFE-0485	660	590	384	364	558	430	590	387	533	50

Typical Arrangement



1. This limit applies to a maximum of 5000 cycles in the life of the coupling
2. All technical data based on 460mm DBSE except for sizes
HSFE - 0409 based on 481mm DBSE
HSFE - 0449 based on 512mm DBSE
HSFE - 0485 based on 533mm DBSE
3. To calculate transmission unit torsional stiffness:-
 $1/Q_t = 2/q_1 + 1/q_3$ MNm/rad
Where

Q_t = Torsional Stiffness of transmission unit
 q_1 = Torsional Stiffness of one membrane pack
 q_3 = Torsional Stiffness of spacer tube per m
 $L = (D.B.S.E - "T") / 1000$ m

To calculate coupling torsional stiffness:-

$$1/Q_c = 2/q_1 + 1/q_3 + 1/q_4 + 1/q_5 \text{ MNm/rad}$$

Where

Q_c = Torsional Stiffness of coupling
 q_4 = Torsional Stiffness of driver shaft penetration
 q_5 = Torsional Stiffness of driven shaft penetration

4. Maximum angular misalignment per disc pack.
(See misalignments capacities)
5. A minimum service factor of 1.5 is recommended.
(see selection procedure)

TYPE HSFE/HLFE/HTFE

H SERIES HIGH PERFORMANCE COUPLINGS

Technical Specification

HSFE/HLFE/HTFE Technical Data (inches)

					Note 2								Axial Misalignment		Note 4	
					Weights		Moment of Inertia WR ²		Note 3							
Coupling Designation	Coupling Rating	Continuous Torque Rating	Peak Torque Rating	Max. Speed	Transmission Unit	Additional Spacer Length	Transmission Unit only	Additional Spacer Length	Membrane pack	Transmission Unit	Spacer Tube		Maximum per Coupling	Equivalent Axial Force	Max Angle	Restoring Moment
									q1	q2	Per inch q3	T				
		HP/100 rpm	lbf in x10 ³	lbf in x10 ³	rpm	lb	lb/in	lb in ²	lb in ² /in	lbf in/ radx10 ⁶	lbf in/ radx10 ⁶	lbf in/ radx10 ⁶	in	± in	lbf	Deg
HSFE-0074	17.3	9.83	18.5	28300	7.60	0.11	17	6.81	3.28	0.44	0.005	2.73	0.05	180	0.375	175
HSFE-0096	36.4	20.7	38.9	23500	11.6	0.141	44.3	17	6.47	0.89	0.01	3.16	0.07	270	0.375	263
HSFE-0115	62.6	35.6	67.0	20000	17.7	0.207	95.4	37.5	11.5	1.86	0.03	3.51	0.09	403	0.375	394
HSFE-0139	107	60.7	114	17300	26.6	0.293	204	81.8	19.5	3.81	0.06	3.98	0.11	563	0.375	700
HSFE-0159	160	90.8	171	14900	37.8	0.339	399	126	31.0	6.11	0.09	4.64	0.12	716	0.375	1094
HSFE-0179	228	129	243	13200	51.5	0.438	695	208	45.2	9.75	0.14	5.19	0.14	925	0.375	1575
HSFE-0200	316	180	338	12000	67.1	0.55	1118	331	61.1	15.1	0.23	5.77	0.15	1116	0.375	2363
HSFE-0220	420	239	450	10600	89	0.68	1843	501	83.3	21.3	0.34	5.81	0.17	1375	0.375	3063
HSFE-0240	546	310	583	9800	108	0.74	2648	644	105	27.5	0.45	6.28	0.18	1609	0.375	3938
HSFE-0262	705	401	753	9100	137	0.89	3987	934	142	39.9	0.64	6.86	0.2	1976	0.375	5163
HSFE-0283	886	503	947	8400	167	1.05	5554	1254	175	51.4	0.86	7.25	0.21	2250	0.375	6475
HSFE-0320	1294	736	1380	7600	223	1.39	9370	2140	250	80.6	1.5	8.07	0.25	2858	0.375	9188
HSFE-0357	1812	1030	1940	6700	318	1.66	17241	3196	353	121	2.2	9.32	0.27	3618	0.375	12513
HSFE-0409	2708	1540	2900	6000	451	2.16	31621	5520	533	194	3.8	10.6	0.31	4761	0.375	18375
HSFE-0449	3582	2036	3830	5500	551	2.67	45455	8246	690	257	5.7	11.3	0.34	5630	0.375	22750
HSFE-0485	4458	2534	4770	5000	703	3.04	68387	11006	882	332	7.6	12.2	0.37	6649	0.375	27563
HLFE-0115	89.1	50.7	95	20000	19.2	0.28	98.8	54.5	13.3	2.48	0.04	3.51	0.06	484	0.25	744
HLFE-0139	152	86.4	162	17300	28.3	0.38	208	109	23	4.78	0.07	3.98	0.07	675	0.25	1313
HLFE-0159	227	129	243	14900	40.5	0.49	409	187	35.4	8.06	0.13	4.64	0.08	855	0.25	2100
HLFE-0179	324	184	346	13200	54.4	0.61	705	296	52.3	12.4	0.20	5.19	0.09	1109	0.25	3063
HLFE-0200	449	255	481	12000	70.1	0.75	1131	453	70	18.6	0.31	5.77	0.1	1341	0.25	4638
HLFE-0220	598	340	640	10600	92.2	0.89	1850	668	95.7	26.6	0.46	5.81	0.11	1652	0.25	6125
HLFE-0240	777	441	830	9800	113	1.05	2668	934	121	35.4	0.64	6.28	0.12	1931	0.25	7700
HLFE-0262	1003	570	1070	9100	141	1.23	3987	1312	163	49.6	0.90	6.86	0.14	2369	0.25	10063
HLFE-0283	1260	716	1350	8400	173	1.5	5588	1843	200	64.7	1.27	7.25	0.15	2700	0.25	12688
HLFE-0320	1841	1046	1970	7600	229	1.9	9336	2999	287	99.2	2.07	8.07	0.17	3431	0.25	18375
HLFE-0357	2577	1465	2760	6700	323	2.35	17105	4634	405	149	3.19	9.32	0.18	4343	0.25	24500
HLFE-0409	3853	2190	4120	6000	461	3.09	31587	8041	611	237	5.55	10.6	0.21	5715	0.25	35875
HLFE-0449	5096	2897	5450	5500	567	3.68	45898	11653	793	310	8.02	11.3	0.23	6750	0.25	44625
HLFE-0485	6343	3606	6780	5000	717	4.3	68114	15913	1012	402	11	12.2	0.26	7976	0.25	54250
HTFE-0179	417	237	446	13200	58.2	0.79	743	388	94.8	19.5	0.27	5.19	0.07	1541	0.167	6300
HTFE-0200	578	329	618	12000	74.3	0.94	1179	583	127	28.4	0.4	5.77	0.07	1861	0.167	9625
HTFE-0220	770	437	823	10600	98.5	1.18	1942	903	173	41.6	0.62	5.81	0.08	2295	0.167	12250
HTFE-0240	999	568	1070	9800	120	1.37	2791	1240	219	55.8	0.86	6.28	0.09	2678	0.167	15750
HTFE-0262	1290	733	1380	9100	149	1.58	4157	1714	295	78	1.18	6.86	0.1	3292	0.167	21000
HTFE-0283	1621	921	1730	8400	180	1.87	5793	2341	362	102	1.61	7.25	0.11	3753	0.167	26250
HTFE-0320	2368	1346	2530	7600	240	2.43	9711	3919	519	160	2.69	8.07	0.12	4766	0.167	36750
HTFE-0357	3316	1885	3550	6700	336	3.06	17650	6133	733	246	4.24	9.32	0.13	6030	0.167	49875
HTFE-0409	4957	2818	5300	6000	475	3.9	32473	10358	1107	392	7.14	10.6	0.15	7936	0.167	72625
HTFE-0449	6557	3727	7010	5500	586	4.72	47329	15231	1435	517	10.5	11.3	0.17	9380	0.167	90563
HTFE-0485	8160	4639	8720	5000	737	5.43	69988	20478	1832	672	14.1	12.2	0.18	11077	0.167	109375

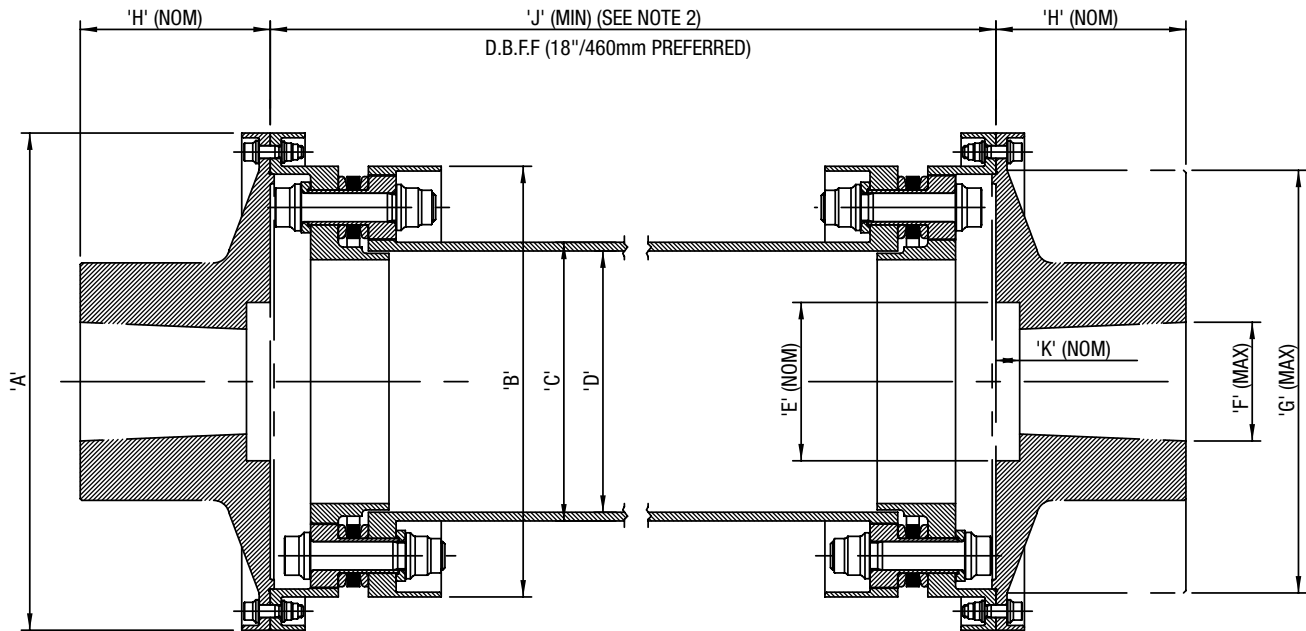
TYPE HSFE/HLFE/HTFE

H SERIES HIGH PERFORMANCE COUPLINGS

HSFE/HLFE/HTFE Dimensional Data (inches)

Coupling Designation			A	B	C	D	E (Nom)	F (Max)	G	H (Nom)	J (Min)	K (Nom)
HSFE-0074			5.0	3.74	2.17	1.97	3.23	2.76	3.74	2.48	5.16	0.39
HSFE-0096			6.0	4.72	2.83	2.64	4.21	3.54	4.72	3.19	5.79	0.51
HSFE-0115	HLFE-0115		6.9	5.67	3.46	3.23	5.04	4.33	5.67	3.90	6.14	0.51
HSFE-0139	HLFE-0139		8.0	6.77	4.21	3.94	6.14	5.12	6.77	4.61	7.36	0.59
HSFE-0159	HLFE-0159		9.3	7.76	4.84	4.57	7.09	5.91	7.76	5.31	8.19	0.59
HSFE-0179	HLFE-0179	HTFE-0179	10.4	8.74	5.47	5.16	8.03	6.69	8.74	6.02	8.98	0.79
HSFE-0200	HLFE-0200	HTFE-0200	11.4	9.76	6.14	5.79	8.98	7.48	9.76	6.73	9.72	0.98
HSFE-0220	HLFE-0220	HTFE-0220	10.4	8.74	5.59	5.16	8.03	8.27	8.74	6.69	8.98	0.79
HSFE-0240	HLFE-0240	HTFE-0240	13.8	11.69	7.40	7.01	10.83	8.86	11.69	7.99	10.79	0.98
HSFE-0262	HLFE-0262	HTFE-0262	14.8	12.76	8.11	7.68	11.89	9.45	12.76	8.50	12.60	0.98
HSFE-0283	HLFE-0283	HTFE-0283	15.9	13.70	8.70	8.23	12.83	10.24	13.70	9.21	13.03	0.98
HSFE-0320	HLFE-0320	HTFE-0320	17.5	15.35	9.88	9.33	14.41	11.42	15.35	10.28	14.06	1.18
HSFE-0357	HLFE-0357	HTFE-0357	19.9	17.24	11.02	10.43	16.14	12.99	17.24	11.69	16.42	1.38
HSFE-0409	HLFE-0409	HTFE-0409	22.4	19.69	12.68	12.01	18.58	14.57	19.69	13.11	18.94	1.57
HSFE-0449	HLFE-0449	HTFE-0449	24.0	21.42	13.98	13.23	20.24	15.35	21.42	13.82	20.16	1.77
HSFE-0485	HLFE-0485	HTFE-0485	26.0	23.23	15.12	14.33	21.97	16.93	23.23	15.24	20.98	1.97

Typical Arrangement



1. This limit applies to a maximum of 5000 cycles in the life of the coupling
2. All technical data based on 18" DBSE except for sizes
HSFE - 0409 based on 19.93" DBSE
HSFE - 0449 based on 20.15" DBSE
HSFE - 0485 based on 20.98" DBSE
3. To calculate transmission unit torsional stiffness:-
 $1/Q_t = 2/q_1 + 1/q_3$
Where

Q_t = Torsional Stiffness of transmission unit
 q_1 = Torsional Stiffness of one membrane pack
 q_3 = Torsional Stiffness of spacer tube per in
 L = (D.B.S.E - "T") in

To calculate coupling torsional stiffness:-

$$1/Q_c = 2/q_1 + 1/q_3 + 1/q_4 + 1/q_5 \text{ MNm/rad}$$

Where

Q_c = Torsional Stiffness of coupling
 q_4 = Torsional Stiffness of driver shaft penetration
 q_5 = Torsional Stiffness of driven shaft penetration

4. Maximum angular misalignment per disc pack.
(see misalignments capacities)
5. A minimum service factor of 1.5 is recommended.
(see selection procedure)

Selection Procedure

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

- Maximum continuous power (kW or HP)
- Speed (N rpm)
- Peak torque (short circuit/overload) (Nm or lb-in)
- 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 (T_m) the machine continuous rated torque.

$$T_m = \frac{kW}{N} = kW \text{ per rpm}$$

$$T_m = \frac{100 \times HP}{N} = HP \text{ per 100 rpm}$$

3. Calculate minimum coupling rating required using the appropriate application factor K_a .

Note: API 671 application factor 1.5 minimum

$$T_c = T_m \cdot K_a$$

Where T_c is the coupling continuous rated torque
 T_m is the machine continuous rated torque
 K_a is the application factor
 K_e is the experience factor consult John Crane

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.

Application Factor

Driving machine	Driven machine	Value of K_a
Turbine or electric motor	Generator	1.5
	Centrifugal pump or compressor < 3800rpm	1.5
	Centrifugal pump or compressor > 3800rpm	$1.5 \cdot K_e$
	Fan or screw compressor	2.25
	Reciprocating pump or compressor with 4 or more cylinders	4
	Reciprocating pump or compressor with less than 4 cylinders	5
Reciprocating engine	All	To be agreed, preferably based on torsional analysis

Ke- Experience Factor

John Crane recommends an experience factor (K_e) to reduce the service factor below 1.5

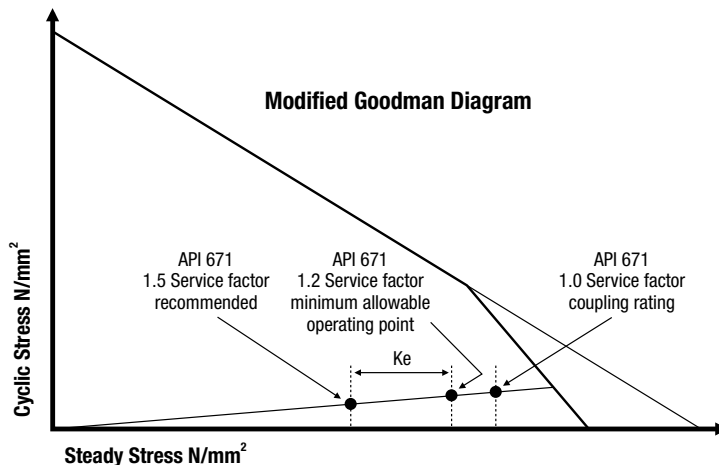
In accordance with API 671:

A lower service factor (1.2 minimum) can be used by mutual consent should weight and or overhung moment of the selected coupling fail to be commensurate to the rotor dynamics.

Refer to:

API 671

EN ISO 10441



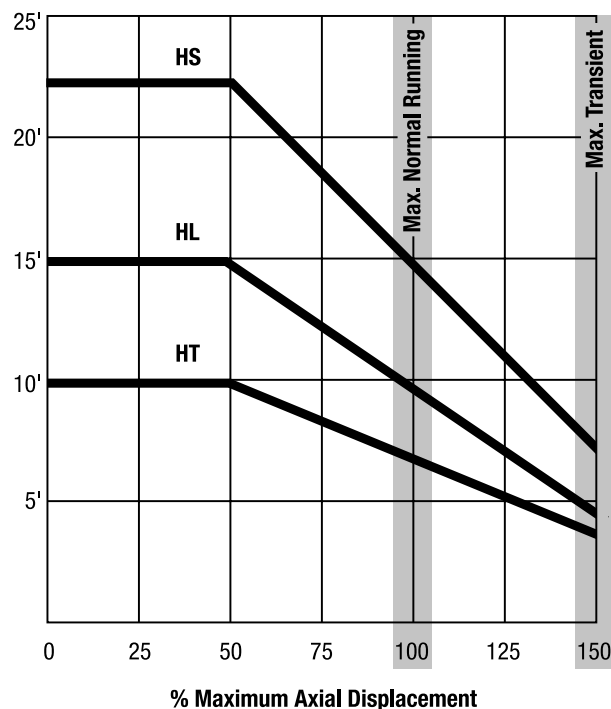
TYPE HSFE/HLFE/HTFE

H SERIES HIGH PERFORMANCE COUPLINGS

Angular Misalignment vs. Axial Displacement

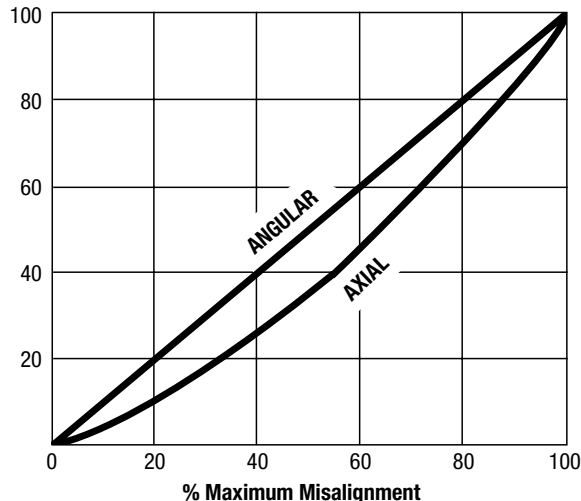
Axial and angular misalignment have a combined effect on the flexible membrane stresses. Therefore, a reduction in one permits an increase in the other. The trade off is shown in the graph opposite. Transient or short term misalignment limits are also shown in this graph, and are usually applicable to the high thermal growths often caused during start up and shut down 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.

Angular Misalignment (minutes)



Restoring Force vs. Displacement

% Axial Force



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 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.

