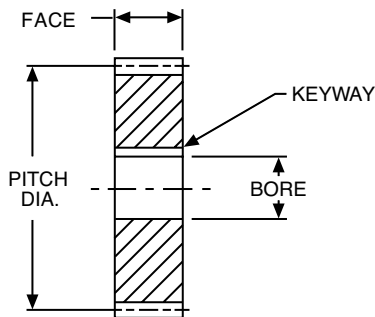


**CATALOG NUMBER / DIMENSIONS ..... 64-65**  
**SELECTION PROCEDURE..... 66**  
**HORSEPOWER & TORQUE RATINGS..... 67-68**  
**STOCK ALTERED / CUSTOM HELICAL GEARS ..... 3-5**  
**HELICAL GEAR ENGINEERING INFORMATION..... 308-314**

# Helical Gears

## 24 through 10 Transverse Diametral Pitch (Steel – Hardened)

14-1/2° Normal Pressure Angle – 45° Helix Angle



### STANDARD TOLERANCES

DIMENSION		TOLERANCE
BORE	All	±.0005

### REFERENCE PAGES

- Alterations — 322
- Horsepower Ratings — 67
- Lubrication — 322
- Materials — 323
- Selection Procedure — 66

NOTE: Normal Diametral Pitch is equal to the Transverse Diametral Pitch divided by the cosine of the Helix Angle.

These gears are hardened all over, except as noted. Teeth on all steel gears are polished.

ALL DIMENSIONS IN INCHES  
ORDER BY CATALOG NUMBER OR ITEM CODE

No. of Teeth	Pitch Dia.	Bore	Keyway	Style See Page 323	RIGHT HAND		LEFT HAND					
					Catalog Number	Item Code	Catalog Number	Item Code				
<b>24</b>					<b>Face: 8-15 Teeth = .375"</b>							
<b>TRANSVERSE DIAMETRAL PITCH</b>					<b>18-72 Teeth = .250"</b>							
8	.333	.1875	*	A	H2408R	18268	H2408L	18270				
10	.417	.250	**		H2410R	18272	H2410L	18274				
12	.500				H2412R	18276	H2412L	18278				
15	.625	.375	1/8 x 1/16		H2415R	18280	H2415L	18282				
18	.750				H2418R	18284	H2418L	18286				
20	.833	.500			H2420R	18288	H2420L	18290				
24	1.000				H2424R	18292	H2424L	18294				
30	1.250	.625			H2430R	18296	H2430L	18298				
36	1.500				H2436R†	18300	H2436L†	18302				
48	2.000				H2448R†	18304	H2448L†	18306				
60	2.500				H2460R†	18308	H2460L†	18310				
72	3.000				H2472R†	18312	H2472L†	18314				
<b>20</b>					<b>Face: 8-15 Teeth = .563"</b>							
<b>TRANSVERSE DIAMETRAL PITCH</b>					<b>18-72 Teeth = .375"</b>							
8	.400			.250	**	A	H2008R	18228	H2008L	18230		
10	.500	.3125	H2010R	18232			H2010L	18234				
12	.600	.375	1/8 x 1/16	H2012R	18236		H2012L	18238				
15	.750	.4375		H2015R	18240		H2015L	18242				
20	1.000	.500		H2020R	18244		H2020L	18246				
25	1.250	.625		H2025R	18248		H2025L	18250				
30	1.500	.750		3/16 x 3/32	H2030R†		18252	H2030L†	18254			
40	2.000				H2040R†		18256	H2040L†	18258			
50	2.500				H2050R†		18260	H2050L†	18262			
60	3.000				H2060R†		18264	H2060L†	18266			
<b>16</b>					<b>Face = .500"</b>							
<b>TRANSVERSE DIAMETRAL PITCH</b>												
12	.750	.375			1/16 x 1/32	A	H1612R	18200	H1612L	18202		
16	1.000	.500			1/8 x 1/16		H1616R	18204	H1616L	18206		
20	1.250		H1620R				18208	H1620L	18210			
24	1.500		H1624R†				18212	H1624L†	18214			
32	2.000		H1632R†				18216	H1632L†	18218			
40	2.500		H1640R†				18220	H1640L†	18222			
48	3.000		H1648R†	18224			H1648L†	18226				
<b>12</b>							<b>Face = .750"</b>					
<b>TRANSVERSE DIAMETRAL PITCH</b>												
12	1.000	.625	1/8 x 1/16	A	H1212R	18170	H1212L	18168				
15	1.250				H1215R	18174	H1215L	18172				
18	1.500				H1218R†	18178	H1218L†	18176				
24	2.000				H1224R†	18182	H1224L†	18180				
30	2.500				H1230R†	18186	H1230L†	18184				
36	3.000				H1236R†	18190	H1236L†	18188				
<b>10</b>					<b>Face = .875"</b>							
<b>TRANSVERSE DIAMETRAL PITCH</b>												
8	.800	.375	1/16 x 1/32	A	H1008R	18130	H1008L	18128				
10	1.000	.500	1/8 x 1/16		H1010R	18134	H1010L	18132				
12	1.200	.625			H1012R	18138	H1012L	18136				
15	1.500	.750			3/16 x 3/32	H1015R†	18142	H1015L†	18140			
20	2.000		H1020R†			18146	H1020L†	18144				
25	2.500		H1025R†			18148	H1025L†	18150				
30	3.000		H1030R†			18154	H1030L†	18152				
40	4.000		H1040R†			18158	H1040L†	18156				

\*1/16" wide x .04" deep slot cut on end of gear for drive pin, not key.  
 \*\*3/32" wide x .06" deep slot cut on end of gear for drive pin, not key.  
 †Teeth only hardened.

## 8 and 6 Transverse Diametral Pitch (Bronze & Steel – Hardened)

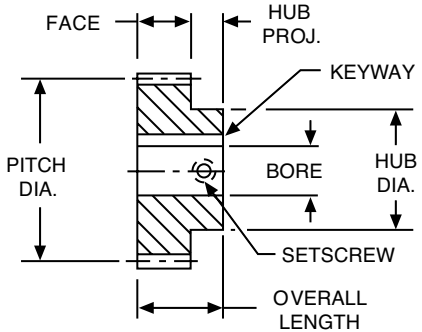
14-1/2° Normal Pressure Angle – 45° Helix Angle

All gears with hubs have setscrew at 90° to keyway. Steel gears have teeth only hardened, except as noted. Teeth on all steel gears are polished.

ALL DIMENSIONS IN INCHES  
ORDER BY CATALOG NUMBER OR ITEM CODE

No. of Teeth	Pitch Dia.	Bore	Hub		Keyway	Style See Page 323	RIGHT HAND		LEFT HAND	
			Dia.	Proj.			Catalog Number	Item Code	Catalog Number	Item Code
<b>8 TRANSVERSE DIAMETRAL PITCH</b>										
							Face without Hubs = 1.000" -with Hubs = .750" Overall Length = Face + Hub Proj.			
<b>STEEL-HARDENED</b>										
8	1.000	.500	-	-	1/8 x 1/16	A	H808R*	18066	H808L*	18064
10	1.250	.625	-	-			H810R*	18070	H810L*	18068
12	1.500	.750	-	-			H812R	18074	H812L	18072
16	2.000	.875	-	-	3/16 x 3/32	A	H816R	18078	H816L	18076
20	2.500						H820R	18082	H820L	18080
24	3.000						H824R	18086	H824L	18084
32	4.000						H832R	18090	H832L	18088
8	1.000	.500	.75	.50	1/8 x 1/16	A	HS808R*	18092	HS808L*	18094
10	1.250	.625	1.00	.50			HS810R*	18096	HS810L*	18098
12	1.500	.750	1.25	.50	3/16 x 3/32		HS812R*	18100	HS812L*	18102
16	2.000	1.000	2.00	.50	1/4 x 1/8	A	HS816R	18104	HS816L	18106
20	2.500						HS820R	18108	HS820L	18110
24	3.000						HS824R	18112	HS824L	18114
32	4.000						HS832R	18116	HS832L	18118
40	5.000					HS840R	18120	HS840L	18122	
48	6.000		2.25			HS848R	18124	HS848L	18126	
<b>BRONZE</b>										
8	1.000	.500	.75	.50	1/8 x 1/16	A	HB808R	18356	HB808L	18358
10	1.250	.625	1.00	.50			HB810R	18360	HB810L	18362
12	1.500	.750	1.24	.50	3/16 x 3/32		HB812R	18364	HB812L	18366
16	2.000	1.000	2.00	.50	1/4 x 1/8	A	HB816R	18368	HB816L	18370
20	2.500						HB820R	18372	HB820L	18374
24	3.000						HB824R	18376	HB824L	18378
32	4.000						HB832R	18380	HB832L	18382
40	5.000					HB840R	18384	HB840L	18386	
48	6.000		2.25			HB848R	18388	HB848L	18390	
<b>6 TRANSVERSE DIAMETRAL PITCH</b>										
							Face without Hubs = 1.250" -with Hubs = 1.000" Overall Length = Face + Hub Proj.			
<b>STEEL-HARDENED</b>										
8	1.333	.625	-	-	1/8 x 1/16	A	H608R	18000	H608L	18002
10	1.667	.750	-	-	3/16 x 3/32		H610R	18004	H610L	18006
12	2.000	1.000	-	-	1/4 x 1/8	A	H612R	18010	H612L	18008
15	2.500						H615R	18014	H615L	18012
18	3.000						H618R	18018	H618L	18016
24	4.000						H624R	18022	H624L	18020
8	1.333	.625	1.00	.75	1/8 x 1/16	A	HS608R	18024	HS608L	18026
9	1.500	.750	1.18	.75	3/16 x 3/32		HS609R	18028	HS609L	18030
10	1.667		1.34				HS610R	18032	HS610L	18034
12	2.000	1.000	1.62	.75	1/4 x 1/8		HS612R	18036	HS612L	18038
15	2.500	1.250	2.00	.75	5/16 x 5/32	A	HS615R	18040	HS615L	18042
18	3.000						HS618R	18044	HS618L	18046
20	3.333						HS620R	18048	HS620L	18050
24	4.000						HS624R	18052	HS624L	18054
30	5.000		2.50			HS630R	18056	HS630L	18058	
36	6.000					HS636R	18060	HS636L	18062	
<b>BRONZE</b>										
12	2.000	1.000	1.62	.75	1/4 x 1/8	A	HB612R	18328	HB612L	18330
15	2.500	1.250	2.00	.75	5/16 x 5/32	A	HB615R	18332	HB615L	18334
18	3.000						HB618R	18336	HB618L	18338
20	3.333						HB620R	18340	HB620L	18342
24	4.000						HB624R	18344	HB624L	18346
30	5.000		2.50			HB630R	18348	HB630L	18350	
36	6.000					HB636R	18352	HB636L	18354	

\*Hardened all over.



### STANDARD TOLERANCES

DIMENSION	TOLERANCE
BORE	All ±.0005

### REFERENCE PAGES

- Alterations — 322
- Horsepower Ratings — 67, 68
- Lubrication — 322
- Materials — 323
- Selection Procedure — 66

NOTE: Normal Diametral Pitch is equal to the Transverse Diametral Pitch divided by the cosine of the Helix Angle.

# Helical Gears



Boston standard stock helical gears are made with a 45° helix angle to transmit motion and/or power between non-intersecting shafts that are parallel or at 90° to each other. They are stocked both right and left-handed. For parallel shaft operation, helical gears having opposite hand helix angles are required, while for shafts at 90° the same hand helix must be used.

For parallel shaft applications, helical gears provide overlapping tooth contact. This results in a smoother, quieter operation and higher horsepower capacity than afforded by spur gears of comparable size.

For 90° shaft applications, the tooth contact area is very small which considerably limits the load capacity. Horsepower ratings are not tabulated in this catalog, for 90° applications.

Boston helical gears are top hobbed, resulting in extremely close concentricity between the pitch diameter and the outside diameter.

B

## Selection Procedure

Approximate horsepower and torque ratings for selected sizes (numbers of teeth) at various operating speeds (RPM) are given for hardened steel helical gears. The ratings are based on the beam strength of the gear tooth. These ratings are for parallel shaft applications under normal operating conditions, that is: properly mounted and lubricated, carrying a smooth load for not more than 10 hours per day or a moderate shock load not more than 15 minutes in two hours (Service Factor 1.0). Refer to Table 1, below, for other types of service.

Ratings for gear sizes or speeds not listed may be interpolated from the values indicated. Pitchline velocities are limited as reflected by the lack of ratings for larger numbers of teeth at higher RPM's in the selection chart. Application in this area is not recommended.

Ref. Parallel shafts are approximately 98% efficient  
90° shafts are approximately 50% efficient

Horsepower ratings for bronze gears are approximately 33% of these ratings.

1. Determine service factor.
  - a. Using Application Classification Chart I, pages 331-332 determine service factor or
  - b. With knowledge of operating conditions and load classification, select service factor from Table 1.

2. Determine Design Horsepower.

**Design HP = Application Load × Service Factor (Table 1)**

3. Select pinion with horsepower capacity equal to (or greater than) design horsepower determined in Step 2. Reference Rating Pages 67, 68.
4. Select a driven gear with a catalog rating equal to (or greater than) the horsepower determined in Step 2.

TABLE 1

Service Factor	Operating Conditions
.8	Uniform – not more than 15 minutes in 2 hours.
1.0	Moderate Shock – not more than 15 minutes in 2 hours. Uniform – not more than 10 hours per day.
1.25	Moderate Shock – not more than 10 hours per day. Uniform – more than 10 hours per day.
1.50	Heavy Shock – not more than 15 minutes in 2 hours. Moderate Shock – more than 10 hours per day.
1.75	Heavy Shock – not more than 10 hours per day.
2.0	Heavy Shock – more than 10 hours per day.

Heavy shock loads and/or severe wear conditions may require the use of higher service factors. Consultation with factory is recommended in these applications.



# Helical Gears

## Approximate Horsepower and Torque\* Ratings

For Class I Service (Service Factor = 1.0)

No.	25 RPM		50 RPM		100 RPM		200 RPM		300 RPM		600 RPM		900 RPM		1200 RPM		1800 RPM		3600 RPM																						
	Teeth	H.P.	Torque	H.P.	Torque	H.P.	Torque	H.P.	Torque	H.P.	Torque	H.P.	Torque	H.P.	Torque	H.P.	Torque	H.P.	Torque	H.P.	Torque																				
<b>8 DIAMETRAL PITCH – 11.31 NORMAL DIAMETRAL PITCH HARDENED STEEL</b>																					<b>1.000" FACE</b>																				
8	.13	323	.25	319	.50	313	.95	300	1.4	288	2.5	258	3.3	234	4.1	214	5.2	183	7.2	127																					
10	.17	428	.34	422	.65	412	1.20	391	1.8	373	3.1	327	4.2	291	5.0	262	6.3	219	8.4	146																					
12	.21	534	.42	525	.81	509	1.50	480	2.2	453	3.7	389	4.9	341	5.8	304	7.1	249	9.2	162																					
16	.29	740	.57	725	1.1	696	2.00	644	2.9	599	4.7	496	6.1	423	7.0	370	8.4	294	10.4	182																					
20	.38	947	.73	923	1.4	877	2.50	799	3.5	733	5.6	588	7.0	491	8.0	421	9.3	328	11.1	197																					
24	.46	1150	.88	1114	1.7	1050	3.00	941	4.1	852	6.3	665	7.7	545	8.8	462	10.1	352	11.9	208																					
32	.61	1547	1.20	1485	2.2	1374	3.80	1196	5.0	1059	7.5	788	9.0	628	9.9	521	11.1	389	12.7	221																					
<b>8 DIAMETRAL PITCH – 11.31 NORMAL DIAMETRAL PITCH BRONZE</b>																					<b>.750" FACE</b>																				
8	.04	97	.08	95.8	.15	93.8	.29	90.0	.41	86.5	.74	77.5	1.00	70.2	1.22	64.2	1.56	54.8	2.17	38.0																					
10	.05	128	.10	127	.20	123	.37	117	.53	112	.93	98.1	1.25	87.3	1.50	78.7	1.88	65.7	2.51	43.9																					
12	.06	160	.12	158	.24	153	.46	144	.65	136	1.11	117	1.46	102	1.73	91.1	2.13	74.7	2.77	48.4																					
16	.09	222	.17	217	.33	209	.61	193	.86	180	1.42	149	1.81	127	2.11	111	2.52	88.2	3.13	54.7																					
20	.11	284	.22	277	.42	263	.76	240	1.05	220	1.68	176	2.10	147	2.41	126	2.81	98.4	3.38	59.2																					
24	.14	345	.27	334	.50	315	.90	282	1.22	256	1.90	199	2.33	163	2.64	138	3.03	106	3.56	62.3																					
32	.18	464	.35	445	.65	412	1.14	359	1.51	318	2.75	236	2.69	188	2.98	156	3.34	117																							
40	.23	582	.44	553	.80	504	1.36	427	1.76	371	2.53	266	2.95	207	3.23	169	3.55	124																							
48	.28	695	.52	655	.93	587	1.54	486	1.97	414	2.74	288	3.15	220	3.40	179																									
<b>6 DIAMETRAL PITCH – 8.48 NORMAL DIAMETRAL PITCH HARDENED STEEL</b>																					<b>1.000" FACE</b>																				
8	.01	572	.45	564	.87	548	1.65	520	2.35	494	4.09	430	5.44	381	6.50	342	8.09	283	10.70	187																					
9	.26	664	.52	653	1.00	633	1.89	597	2.68	564	4.61	484	6.06	424	7.19	378	8.84	310	11.47	201																					
10	.30	758	.59	745	1.14	720	2.14	674	3.02	634	5.11	537	6.66	466	7.84	412	9.54	334	12.17	213																					
12	.37	944	.73	924	1.41	887	2.61	821	3.64	764	6.02	633	7.71	540	8.97	471	10.71	375	13.29	233																					
15	.48	1217	.94	1185	1.79	1127	3.26	1026	4.48	942	7.19	755	9.00	630	10.30	541	12.04	421	14.48	253																					
18	.59	1478	1.14	1433	2.14	1350	3.84	1210	5.22	1096	8.14	855	10.00	700	11.30	593	12.98	454	15.25	267																					
20	.66	1670	1.28	1613	2.40	1511	4.25	1340	5.73	1204	8.79	924	10.69	749	11.99	630	13.65	478																							
24	.80	2024	1.54	1942	2.85	1798	4.97	1565	6.60	1386	9.82	1031	11.72	821	12.98	682	14.55	510																							
30	1.01	2546	1.92	2420	3.50	2203	5.93	1868	7.72	1622	11.06	1162	12.92	905	14.11	741	15.54	544																							
36	1.21	3048	2.28	2872	4.08	2573	6.76	2131	8.65	1818	12.02	1262	13.81	967	14.92	783																									
<b>6 DIAMETRAL PITCH – 8.48 NORMAL DIAMETRAL PITCH HARDENED STEEL</b>																					<b>1.250" FACE</b>																				
8	.28	715	.56	705	1.09	685	2.06	650	2.94	617	5.12	537	6.79	476	8.13	427	10.11	354	13.37	234																					
10	.38	948	.74	931	1.43	899	2.67	842	3.77	792	6.39	672	8.32	583	9.80	515	11.93	418	15.22	266																					
12	.47	1180	.92	1155	1.76	1109	3.26	1026	4.55	955	7.53	791	9.64	675	11.21	589	13.38	469	16.61	291																					
15	.60	1521	1.18	1482	2.24	1409	4.07	1282	5.60	1177	8.99	944	11.25	788	12.87	676	15.04	527	18.10	317																					
18	.73	1848	1.42	1791	2.68	1687	4.80	1512	6.52	1370	10.17	1068	12.50	876	14.12	742	16.22	568	19.06	334																					
24	1.00	2529	1.93	2428	3.57	2247	6.21	1956	8.24	1732	12.27	1289	14.65	1026	16.23	852	18.19	637																							
<b>6 DIAMETRAL PITCH – 8.48 NORMAL DIAMETRAL PITCH BRONZE</b>																					<b>1.000" FACE</b>																				
12	.15	378	.29	370	.56	355	1.04	328	1.46	306	2.41	253	3.08	216	3.59	188	4.28	150	5.32	93.1																					
15	.19	487	.38	474	.72	451	1.30	410	1.79	377	2.88	302	3.60	252	4.12	216	4.81	169	5.79	101																					
18	.23	591	.45	513	.86	540	1.54	484	2.09	439	3.25	342	4.00	280	4.52	237	5.19	182	6.10	107																					
20	.26	668	.51	645	.96	604	1.70	536	2.29	482	3.52	369	4.28	300	4.80	252	5.46	191																							
24	.32	810	.62	777	1.14	719	1.99	626	2.64	554	3.93	412	4.69	328	5.19	273	5.82	204																							
30	.40	1018	.77	968	1.40	881	2.37	747	3.09	649	4.42	465	5.17	362	5.65	296	6.22	218																							
36	.48	1219	.91	1149	1.63	1029	2.70	852	3.46	727	4.81	505	5.52	387	5.97	313																									

Ratings are based on strength calculation. Basic static strength rating, or for hand operation of above gears is approximately 3 times the 100 RPM rating.

NOTE: Ratings to right of heavy line exceed 1500 Feet per Minute and should be used for interpolation purposes only.

\*Torque Rating (Lb. Ins.)