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Specification for

Main friction clutches, main power-take-off assemblies and associated attachments for internal combustion engines

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Foreword

This British Standard has been prepared under the authority of the Mechanical Engineering Industry Standards Committee to facilitate the production and interchange of main friction clutches, main power-take-off assemblies and associated attachments for internal combustion engines, excluding aircraft engines. In general, dimensions specified are based on those of components in current use, but in certain instances they have been adjusted to suit applicable standard practice. The need for interchangeability has necessitated consideration of current American practice and where necessary, for instance on flywheel housings, clutch housing spigots, clutch splines, main power-take-off assemblies and cam-operated friction plate clutches, certain American Standard dimensions have been adopted.

The principal changes in this revision of BS 3092:1959 include the up-dated dimensions for single and multi-plate coil spring operated clutches and the introduction of details of diaphragm spring clutches. Because the identification code for clutches is no longer used, reference to it in the tables has been deleted.

This standard does not specify dimensions for shaft couplings of rigid and flexible types, neither does it specify dimensions for flywheel attachments to crankshafts. Automatic transmissions are not included.

NOTE Where metric equivalents are given the figures in imperial units are to be regarded as the standard. The metric conversions are approximate. More accurate conversions should be based on BS 2856, *"Precise metric conversions of inch and metric sizes on engineering drawings"*.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 34, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 General

1.1 Scope

This British Standard specifies envelope, attachment and certain other dimensions of flywheel-mounted main drive components for internal combustion engines (excluding aircraft engines).

In Section 5, "Housings", only dimensions relevant to the mating of the components are specified.

NOTE The titles of the British Standards referred to in this standard are listed on the inside back cover.

1.2 Splines

Splines for clutch hubs shall be as specified in Figure 1 and Table 1. For splined hubs of driven plates above 7 in nominal diameter, two sizes of splines are specified for each size of certain clutches to cater for light and heavy duty uses.

Subsequent to the publication of BS 3550, a suitable range of involute splines may be used as an alternative to the 10 spline series now specified.

1.3 Spigot (pilot) bearings

The nominal dimensions for spigot (pilot) bearings specified in this standard (which may be located in flywheels, crankshafts or separate housings), are those for single-row ball or roller bearings which conform to BS 292.

NOTE When other types of bearings are used, it is recommended that in the interest of interchangeability their bores be such as to accommodate clutch-shaft spigots made to suit the specified ball or roller bearings.

It is recommended that, in order to accept the greater length of spigot needed for plain type bearings, flywheels and crankshafts of engines using spring-engaged clutches up to and including 10 in nominal diameter be machined to accommodate a bearing $2\frac{1}{2}$ times the width of those ball and roller bearings specified in the relevant tables of this standard.

1.4 Dowels

Dimensions of stepped dowels shall be as specified in Figure 2 and Table 2a and Table 2b, to ensure:

- 1) Positive retention of the dowels in the flywheel when the clutch cover is in position.
- 2) Asymmetrical assembly of clutch to flywheel.

Flywheels shall be balanced with dowels in situ.

When measured on the assembled engine, clutch dowels shall be co-axial and equidistant from the crankshaft centre line within 0.004 in.

1.5 Tolerances

In order to ensure interchangeability and correct functioning, tolerances shall be as shown in the relevant tables. Tolerances specified in BS 1916 have been incorporated wherever their use would not preclude interchangeability between US and UK products.

The eccentricity and deviation from squareness of the parts listed in Table A, when measured relative to the crankshaft centre-line, shall not exceed the values specified in Table A.

Table A — Flywheel data

Type of clutch coupling or power-take-off assembly	Eccentricity of spigot bearing bore (FIM)	Eccentricity of clutch spigot bore (diameter A) ^a (FIM)	Squareness of clutch mounting and friction faces (FIM) (inch per inch of diameter)
Spring-engaged flat face, equally-spaced fixing holes	0.005	—	0.000 25
Spring-engaged flat face, unequally-spaced fixing holes	0.005	—	0.000 25
Spring-engaged inset face, equally-spaced fixing holes	0.005	0.005	0.000 25
Friction plate, cam-operated	0.005	0.005	0.000 25
Power-take-off assemblies	0.005	0.005	0.000 25
Flywheel-spigoted couplings — industrial clutches	0.005	0.005	0.000 25
All dimension are in inches ^a See Figure 10, Figure 19, Figure 21 and Figure 22 for diameter A.			

2 Main clutches

2.1 Friction plate spring-engaged single plate clutches

The envelope and attachment dimensions for friction plate spring-engaged single plate clutches and the relevant flywheel dimensions shall be as given in the following tables and figures:

Table 3, Figure 3 Single plate coil spring-engaged clutches (flat face, equally spaced fixing holes and dowel location).

Table 4, Figure 4 Flywheels for coil spring-engaged clutches (flat face, equally spaced fixing holes and dowel location).

Table 5, Figure 5 Single plate coil spring-engaged clutches (flat face, unequally spaced fixing holes and dowel location).

Table 6, Figure 6 Flywheels for coil spring-engaged clutches (flat face, unequally spaced fixing holes and dowel location).

Table 7, Figure 7 Single plate coil spring-engaged clutches (inset face, equally spaced fixing holes and dowel location).

Table 8, Figure 8 Flywheels for coil spring-engaged clutches (inset face, equally spaced fixing holes and dowel location).

Table 9, Figure 9 Single plate coil spring-engaged clutches (inset face, equally spaced fixing holes and spigot location).

Table 10, Figure 10 Flywheels for coil spring-engaged clutches (inset face, equally spaced fixing holes and spigot location).

Table 11, Figure 11 Diaphragm spring clutches.

Table 12, Figure 12 Flywheel for 6½ inch diaphragm spring clutch (flat face, unequally-spaced fixing holes and dowel location).

Table 13, Figure 13 Flywheels for 7½ inch, 8½ inch, 9½ inch and 10½ inch diaphragm spring clutches (flat face, equally spaced fixing holes and dowel location).

Table 14, Figure 14 Flywheels for 12 inch and 13 inch diaphragm spring clutches (flat face, unequally-spaced fixing holes and dowel location).

Table 15, Figure 15 Flywheels for 14 inch and 15 inch diaphragm spring clutches (inset face, equally-spaced fixing holes and dowel location).

2.2 Friction plate cam-operated single plate clutches

The envelope attachment dimensions for friction plate cam-operated single plate clutches and the relevant flywheel dimensions shall be as specified in the following tables and figures:

Table 18, Figure 18 Friction plate cam-operated clutches.

Table 19, Figure 19 Flywheels for friction plate cam-operated clutches.

2.3 Friction plate spring-engaged and cam-operated multi-plate clutches

The attachment dimensions for multi-plate clutches shall be as those listed for single plate spring-engaged and cam-operated clutches of the same nominal diameters. The number of pitch increments is dependent on the number of plates in all types of multi-plate clutches. The size of each pitch increment (s) shall be as specified in the following tables and figures. Flywheels may be designed “to suit” or be modified by the addition of a separate adaptor ring.

Table 16, Figure 16 Details for multi-plate coil spring-engaged and cam-operated clutches (flat face).

Table 17, Figure 17 Details for multi-plate coil spring-engaged cam-operated clutches (inset face).

NOTE It should be noted that the clutch plates are not necessarily interchangeable positionally in a given multi-plate clutch or any one of them interchangeable with a plate in a single-plate clutch of the same nominal diameter.

2.4 Flywheel attachment and spigot dimensions for other clutches

Mating spigot dimensions for clutches of types other than those previously referred to in this section, e.g. over-centre, centrifugal, hydraulic, shall be as specified in the following tables and figures:

Table 22, Figure 22 Flywheels for flywheel-spigoted couplings and industrial clutches.

Table 23, Figure 23 Mating spigot dimensions for direct flywheel mounted clutches and flywheel-spigoted couplings.

NOTE “Spigoting” dimensions for these flywheels conform to those for flywheels for friction-plate cam-operated clutches (Table 19, Figure 19) and flywheels for power-take-off assemblies (Table 21 and Figure 21).

3 Main power-take-off assemblies

3.1 Definition of power-take-off assembly

For the purposes of this standard a power-take-off assembly is defined as a main drive assembly and a clutch housing complete with actuating mechanism and output shaft.

3.2 Dimensions

The envelope and attachment dimensions for power-take-off assemblies and the relevant flywheel dimensions shall be as specified in:

Table 20, Figure 20 Power-take-off assemblies (single and multi-plate).

Table 21, Figure 21 Flywheels for power-take-off assemblies (single and multi-plate).

4 Flywheel-spigoted couplings

4.1 Attachment and mating spigot dimensions

The flywheel attachment dimensions and mating spigot dimensions for attachment of direct main power transmission couplings (excluding shaft coupling flanges) shall be as specified in:

Table 22, Figure 22 Flywheels for flywheel-spigoted couplings and industrial clutches.

Table 23, Figure 23 Mating spigot dimensions for direct flywheel mounted clutches and flywheel-spigoted couplings.

NOTE “Spigoting” dimensions for these flywheels conform to those for flywheels for friction-plate cam-operated clutches (Table 19, Figure 19) and flywheels for power-take-off assemblies (Table 21, Figure 21).

5 Housings

5.1 Engine flywheel housings

Engine flywheel housing dimensions for the attachment of clutch housing shall be as specified in: Table 24, Figure 24 Engine flywheel housings.

5.2 Clutch housings

Clutch housing dimensions for mating with the engine flywheel housings specified in Clause 13 above, shall be as specified in: Table 25, Figure 25 Clutch housings.

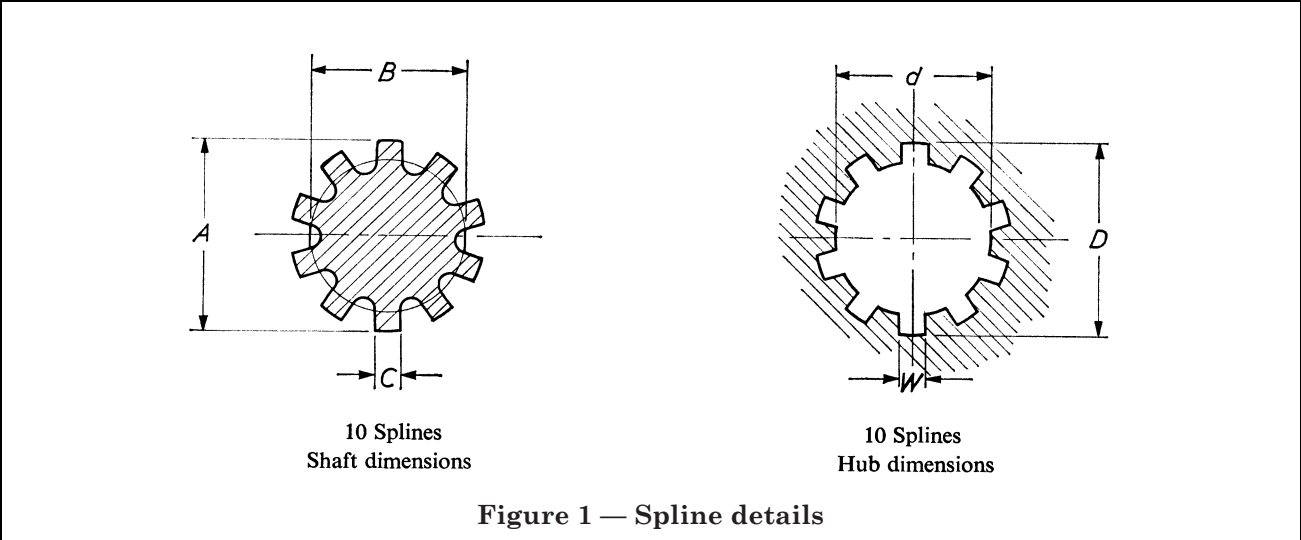


Figure 1 — Spline details

Table 1 — Spline details
(BASED ON SAE PRACTICE)

Dimensions are in inches unless otherwise stated

Spline size		A		B		C		D		d		W	
in	mm	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
3/4	19.1	0.744	0.742	0.606	0.603	0.114	0.112	0.769	0.754	0.612	0.607	0.117	0.115
7/8	22.2	0.868	0.866	0.706	0.703	0.134	0.132	0.894	0.879	0.714	0.708	0.137	0.135
1	25.4	0.993	0.991	0.807	0.804	0.153	0.151	1.019	1.004	0.815	0.809	0.156	0.154
1 1/8	28.6	1.117	1.115	0.908	0.904	0.173	0.171	1.144	1.129	0.918	0.910	0.176	0.174
1 1/4	31.8	1.242	1.240	1.010	1.005	0.192	0.190	1.269	1.254	1.020	1.012	0.195	0.193
1 3/8	34.9	1.367	1.365	1.111	1.106	0.212	0.210	1.394	1.379	1.121	1.113	0.215	0.213
1 1/2	38.1	1.492	1.490	1.212	1.207	0.231	0.229	1.519	1.504	1.224	1.214	0.234	0.232
1 5/8	41.3	1.617	1.615	1.313	1.308	0.251	0.249	1.644	1.629	1.325	1.315	0.254	0.252
1 3/4	44.5	1.742	1.740	1.415	1.410	0.270	0.268	1.769	1.754	1.427	1.417	0.273	0.271
2	50.8	1.991	1.989	1.616	1.610	0.308	0.306	2.019	2.004	1.628	1.618	0.312	0.309
2 1/4	57.2	2.241	2.239	1.819	1.813	0.347	0.345	2.269	2.254	1.831	1.821	0.351	0.348
2 1/2	63.5	2.491	2.489	2.021	2.015	0.386	0.384	2.519	2.504	2.033	2.023	0.390	0.387
3	76.2	2.991	2.989	2.426	2.420	0.464	0.462	3.019	3.004	2.438	2.428	0.468	0.465

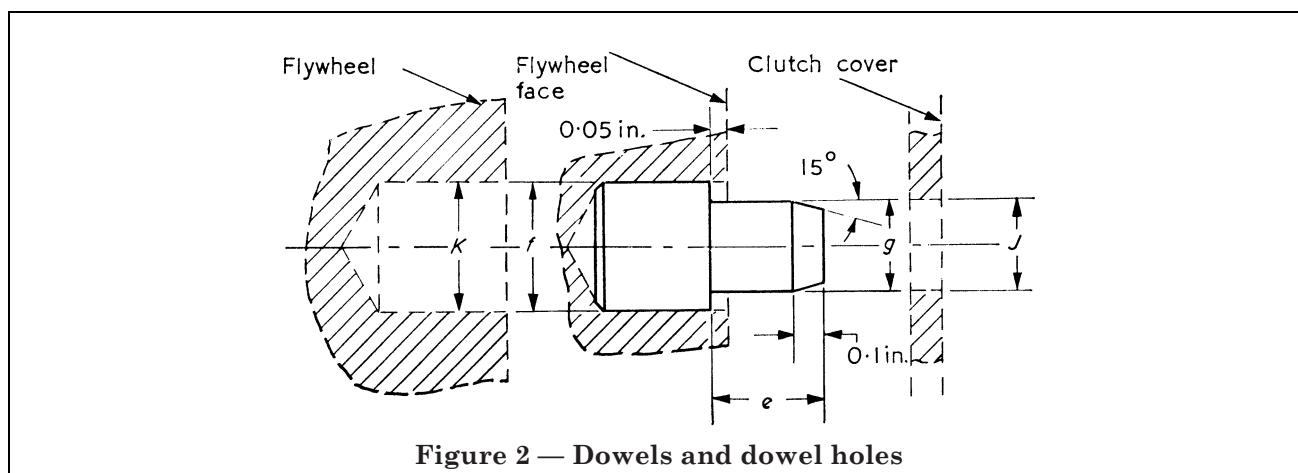


Figure 2 — Dowels and dowel holes

Table 2a — Dimensions of dowels and dowel holes: coil spring clutches

Dimensions are in inches unless otherwise stated.

Nominal dia. of clutch										e min.	
in	mm	J_1	J_2	g_1	g_2	K_1	K_2	f_1	f_2	Single plate	Multi-plate
6	152										—
7	178	0.2505	0.2505	0.2485	0.2485	0.3443	0.3443	0.3447	0.3447		
8	203	0.2495	0.2495	0.2480	0.2480	0.3437	0.3437	0.3443	0.3443	0.25	
9	229										0.50
10	254		0.313		0.3110		0.4069		0.4073		
11	279	0.313	0.312	0.3110	0.3105	0.4069	0.4062	0.4073	0.4069		
12	305	0.312	0.376	0.3105	0.3740	0.4062	0.4694	0.4069	0.4698		
13	330		0.375		0.3735		0.4687		0.4694	0.35	0.60
14	356										
15	381	0.376	0.4385	0.3740	0.4365	0.4694	0.5320	0.4698	0.5324		
16	406	0.375	0.4375	0.3735	0.4360	0.4687	0.5312	0.4694	0.5320	0.45	0.70
17	432										

Table 2b — Dimensions of dowels and dowel holes: diaphragm spring clutches

Nominal dia. of clutch		No. of dowels and dowel holes									e min.	
in	mm		J_1	J_2	g_1	g_2	K_1	K_2	f_1	f_2	Single plate	Multi-plate
6½	165	3										
7½	191	3	0.2505	—	0.2485	—	0.3443	—	0.3447	—	0.25	—
8½	216	3	0.2495	—	0.2480	—	0.3437	—	0.3443	—		
9½	241	3										0.50
10½	267	3										
12	305	2	0.313	—	0.3110	—	0.4069	—	0.4073	—		
13	330	2	0.312	0.376	0.3105	0.3740	0.4062	0.4694	0.4069	0.4698		
14	356	2		0.375		0.3735		0.4687		0.4694	0.35	0.60
15	381	2	0.376	0.4385	0.3740	0.4365	0.4694	0.5320	0.4698	0.5324		
			0.375	0.4375	0.3735	0.4360	0.4687	0.5312	0.4694	0.5320		

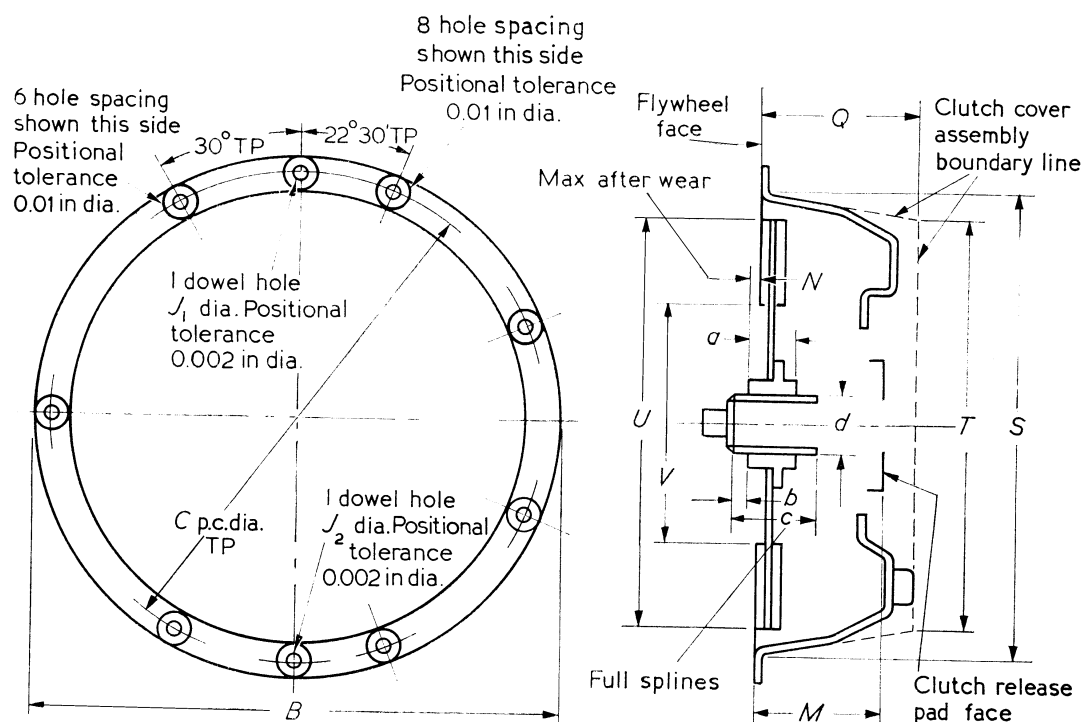


Figure 3 — Single plate, coil spring-engaged clutches (flat face, equally spaced fixing holes and dowel location)

Table 3 — Dimensions of single plate coil spring-engaged clutches (flat face, equally spaced fixing holes and dowel location)

All dimensions are in inches

Clutch size	B	C	M		N	Q	S	T
		nominal	max.	min.				
6	8.25	7.625	2.09	1.44	0.10	2.07	6.90	6.80
7	9.50	8.75	2.47	1.65	0.29	2.45	9.80	7.60
8	10.63	9.875	2.66	1.76	0.29	2.70	9.80	8.20
9	11.31	10.625	2.80	1.85	0.32	2.90	9.80	9.40
10	12.38	11.625	2.94	1.83	0.34	2.95	10.80	10.40
11	13.38	12.625	2.94	1.83	0.38	3.11	11.60	10.80

Clutch size	U	V	Fixing holes		a	b	c	d
			No.	Dia.				
6	6.28	4.25	6	0.355	1.03	0.08	1.30	0.875
7	7.25	4.88	6	0.355	1.30	0.08	1.60	1.000
8	8.03	5.25	6	0.355	1.30	0.08	1.60	1.000 or 1.250
9	9.16	6.12	6	0.355	1.30	0.08	1.68	1.000 or 1.250
10	9.87	6.12	6	0.410	1.50	0.08	1.80	1.250 or 1.375
11	11.00	6.75	8	0.410	1.50	0.08	1.80	1.375 or 1.500

For dowel holes (dimensions J_1 and J_2) see Figure 2 and Table 2a

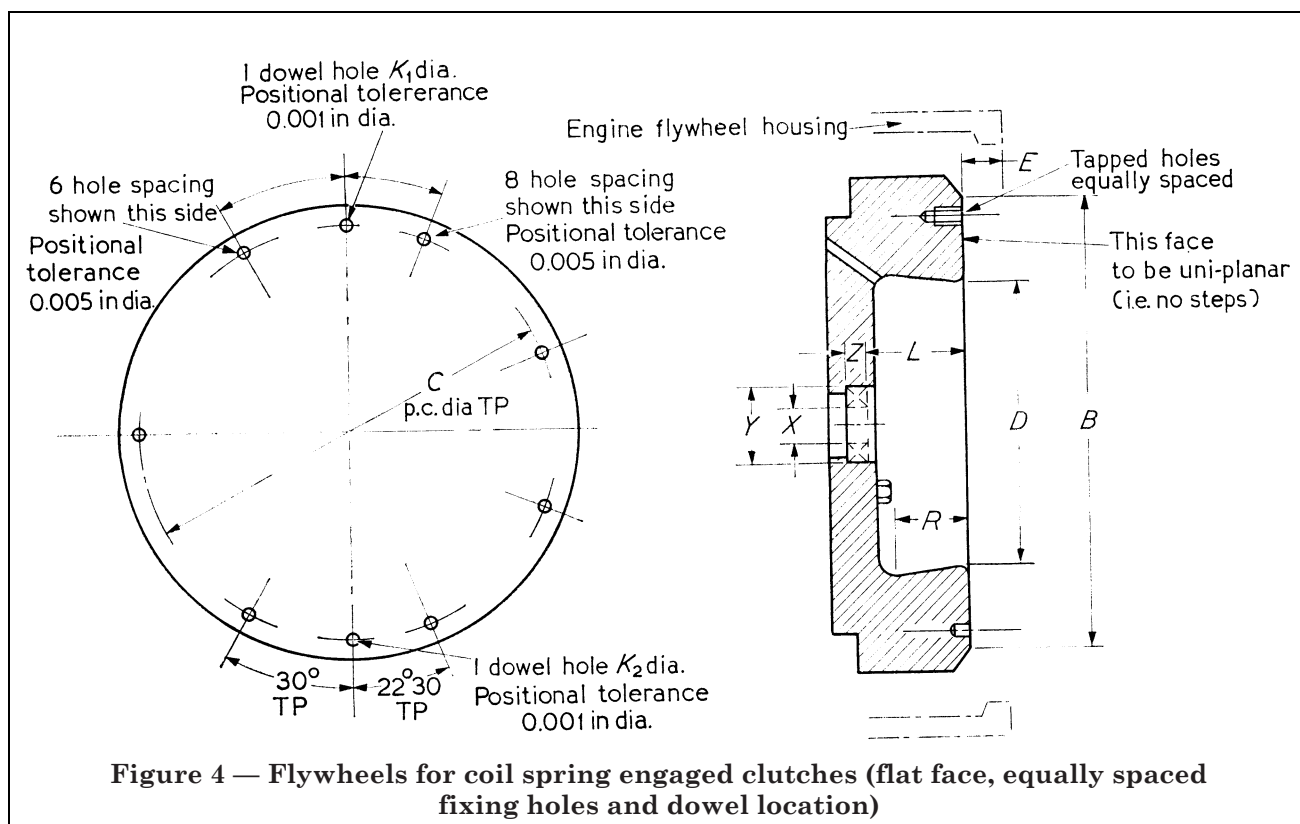


Table 4 — Dimensions of flywheels for coil spring-engaged clutches (flat face, equally spaced fixing holes and dowel location)

Dimensions are in inches unless otherwise stated

Clutch size	B	C	D		E	L	R	Nominal			Tapped holes		Minimum size flywheel housing to accommodate clutch (see Figure 24 and Table 24)	
								X	Y	Z	No.	Size UNC Class 2B		
	min.	nomina l	max.	min.	min.	mm	mm	mm						
	6	8.25	7.625	4.15	3.60	1.000	0.500	0.30	12	32				10
7	9.50	8.750	4.75	4.20	1.000	0.650	0.30	15	35	11	6	$\frac{5}{16}-18$	H.6	
8	10.63	9.875	5.15	4.30	1.000	0.650	0.30	15	35	11	6	$\frac{5}{16}-18$	H.5	
9	11.31	10.625	5.90	4.50	1.750	0.650	0.30	20	47	14	6	$\frac{5}{16}-18$	H.5	
10	12.38	11.625	6.00	5.20	1.750	0.700	0.30	20	47	14	6	$\frac{3}{8}-16$	H.4	
11	13.38	12.625	6.50	5.20	1.750	0.750	0.30	25	52	15	8	$\frac{3}{8}-16$	H.4	
For dowel hole dimensions K ₁ and K ₂ , see Figure 2 and Table 2a														

For dowel hole dimensions K_1 and K_2 see Figure 2 and Table 2a