CHAPTER 5

NEWALL STANDARD SYSTEM OF FITS AND TOLERANCES

General

1. The Newall standard system of fits and tolerances is based on the production of holes which are as near to standard as is commercially possible. In this system two grades of holes are accepted as commercial standards and these are classified as Classes A and B.

2. The allowances for the fit required is made on the shaft in accordance with the classification indicated in the tables below, for the particular diameter and class of fit.

TOLERANCES OF STANDARD HOLES—CLASSES A AND B

Nominal Diameters		Up to $\frac{1}{2}$ in.	$\frac{9}{16}$ to 1 in.	$1\frac{1}{16}$ to 2 in.	$2\frac{1}{16}$ to 3 in.	$3\frac{1}{16}$ to 4 in.	$4\frac{1}{16}$ to 5 in.	$5\frac{1}{16}$ to 6 in.
A High Limit	+	0·00025	0·00050	0·00075	0·00100	0·00100	0·00100	0·00150
A Low Limit	—	0·00025	0·00025	0·00025	0·00050	0·00050	0·00050	0·00050
A *Tolerance*		0·00050	0·00075	0·00100	0·00150	0·00150	0·00150	0·00200
B High Limit	+	0·00050	0·00075	0·00100	0·00125	0·00150	0·00175	0·00200
B Low Limit	—	0·00050	0·00050	0·00050	0·00075	0·00075	0·00075	0·00100
B *Tolerance*		0·00100	0·00125	0·00150	0·00200	0·00225	0·00250	0·00300

ALLOWANCES ON SHAFTS FOR VARIOUS FITS

:—

Force fit, requiring hydraulic pressure or heat applied.—

Nominal Diameters		Up to $\frac{1}{2}$ in.	$\frac{9}{16}$ to 1 in.	$1\frac{1}{16}$ to 2 in.	$2\frac{1}{16}$ to 3 in.	$3\frac{1}{16}$ to 4 in.	$4\frac{1}{16}$ to 5 in.	$5\frac{1}{16}$ to 6 in.
F High Limit	+	0·00100	0·00200	0·00400	0·00600	0·00800	0·01000	0·01200
F Low Limit	+	0·00050	0·00150	0·00300	0·00450	0·00600	0·00800	0·01000
F *Tolerance*		0·00050	0·00050	0·00100	0·00150	0·00200	0·00200	0·00200

CLASS D:—

Driving fit, requiring arbor press or hammer to drive in.—

Nominal Diameters		Up to $\frac{1}{2}$ in.	$\frac{9}{16}$ to 1 in.	$1\frac{1}{16}$ to 2 in.	$2\frac{1}{16}$ to 3 in.	$3\frac{1}{16}$ to 4 in.	$4\frac{1}{16}$ to 5 in.	$5\frac{1}{16}$ to 6 in.
D High Limit	+	0·00050	0·00100	0·00150	0·00250	0·00300	0·00350	0·00400
D Low Limit	+	0·00025	0·00075	0·00100	0·00150	0·00200	0·00250	0·00300
D *Tolerance*		0·00025	0·00025	0·00050	0·00100	0·00100	0·00100	0·00100

CLASS P:—

Push fit, requires to be pushed or tapped into position but is not free to rotate.—

Nominal Diameters		Up to $\frac{1}{2}$ in.	$\frac{9}{16}$ to 1 in.	$1\frac{1}{16}$ to 2 in.	$2\frac{1}{16}$ to 3 in.	$3\frac{1}{16}$ to 4 in.	$4\frac{1}{16}$ to 5 in.	$5\frac{1}{16}$ to 6 in.
P	High Limit —	0·00025	0·00025	0·00025	0·00050	0·00050	0·00050	0·00050
	Low Limit —	0·00075	0·00075	0·00075	0·00100	0·00100	0·00100	0·00100
	Tolerance	0·00050	0·00050	0·00050	0·00050	0·00050	0·00050	0·00050

CLASSES X, Y, Z:—

Running fits, three grades. Class X is suitable for engine bearing and other work where any easy fit is required with clearance allowed for a liberal oil film. Class Y is suitable for high speed work and for good machine work, whilst Class Z is suitable for fine tool work.

Nominal Diameters		Up to $\frac{1}{2}$ in.	$\frac{9}{16}$ to 1 in.	$1\frac{1}{16}$ to 2 in.	$2\frac{1}{16}$ to 3 in.	$3\frac{1}{16}$ to 4 in.	$4\frac{1}{16}$ to 5 in.	$5\frac{1}{16}$ to 6 in.
X	High Limit —	0·00100	0·00125	0·00175	0·00200	0·00250	0·00300	0·00350
	Low Limit —	0·00200	0·00275	0·00350	0·00425	0·00500	0·00575	0·00650
	Tolerance	0·00100	0·00150	0·00175	0·00225	0·00250	0·00275	0·00300
Y	High Limit —	0·00075	0·00100	0·00125	0·00150	0·00200	0·00225	0·00250
	Low Limit —	0·00125	0·00200	0·00250	0·00300	0·00350	0·00400	0·00450
	Tolerance	0·00050	0·00100	0·00125	0·00150	0·00150	0·00175	0·00200
Z	High Limit —	0·00050	0·00075	0·00075	0·00100	0·00100	0·00125	0·00125
	Low Limit —	0·00075	0·00125	0·00150	0·00200	0·00225	0·00250	0·00275
	Tolerance	0·00025	0·00050	0·00075	0·00100	0·00125	0·00125	0·00150

P4994 M /1155 10/44 5250 C & P Gp. 1