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Steel — Conversion of elongation values — Part I : Carbon and low alloy steels

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Descriptors : steels, unalloyed steels, low alloy steels, tests, tension tests, test specimens, elongation.

FOREWORD

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Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2566/I was drawn up by Technical Committee ISO/TC 17, *Steel*, and circulated to the Member Bodies in March 1972.

It has been approved by the Member Bodies of the following countries :

Australia	India	Romania
Austria	Ireland	South Africa, Rep. of
Canada	Israel	Spain
Czechoslovakia	Italy	Sweden
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Hungary	Portugal	U.S.S.R.

The Member Body of the following country expressed disapproval of the document on technical grounds :

Belgium

Steel — Conversion of elongation values — Part I : Carbon and low alloy steels

0 INTRODUCTION

Several different gauge lengths are commonly in use for the determination of percentage elongation of steels in tensile testing. In metric units, gauge lengths of 50, 100 and 200 mm are used, while in inch units, gauge lengths of 2, 4 and 8 in are used. Proportional gauge lengths of $k\sqrt{S_o}$ are also used for flat and round test pieces, where k may be one of a number of values, i.e. $4 - 5,65 - 8,16 - 11,3$.

Discussion within ISO Technical Committee 17, *Steel*, has resulted in the adoption of $5,65\sqrt{S_o}$ as the internationally preferred proportional gauge length.

Arising from this agreement and the existence of specifications stipulating minimum percentage elongations on different gauge lengths, a growing need has been evident for an International Standard which could be used to convert test results into values based on the different gauge lengths. This document accordingly includes tables of conversion factors, tables of actual conversions for some of the more commonly used gauge lengths and elongation values, and charts which may also be used for such conversions. When using these conversions, however, note should be taken of the limitations on their applicability as stated in section 1.

While, as indicated, the conversions are considered to be reliable within the stated limitations and may generally be used for acceptance purposes, because of the various factors influencing the determination of percentage elongations, in cases of dispute the elongation shall be determined on the gauge length stated in the relevant material specification.

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method of converting percentage elongations after fracture obtained on various proportional and non-proportional gauge lengths to other gauge lengths.

The formula (see section 4) on which the conversions are based is considered to be reliable when applied to carbon, carbon manganese, molybdenum and chromium molybdenum steels within the tensile strength range 300 to 700 N/mm^2 and in the hot-rolled, hot-rolled and normalized or annealed condition, with or without tempering.

These conversions are not applicable to

a) cold reduced steels;

b) quenched and tempered steels;

c) austenitic steels;

nor should they be used where the gauge length exceeds $25\sqrt{S_o}$ or the width to thickness ratio of the test piece exceeds 20.

2 SYMBOLS

In this International Standard the following symbols are used :

Symbol	Description
A	Percentage elongation on gauge length L_o after fracture, obtained on test.
A_r	Percentage elongation on a different gauge length, required by conversion.
d	Diameter of test piece.
L_o	Original gauge length.
S_o	Original cross-sectional area of test piece.

3 DEFINITIONS

For the purposes of this International Standard, the following definitions apply :

3.1 gauge length : Any length of the parallel portion of the test piece used for measurement of strain. The term is hereafter used in this International Standard to denote the original gauge length L_o marked on the test piece for the determination of percentage elongation after fracture (A).

3.2 proportional gauge length : A gauge length having a specified relation to the square root of the cross-sectional area, for example, $5,65\sqrt{S_o}$.

3.3 non-proportional gauge length : A gauge length not specifically related to the cross-sectional area of the test piece, usually expressed as a given dimension, for example 50 mm or 2 in.

4 BASIC FORMULA

The data contained in this International Standard are based on the "Oliver" formula[1] which is now widely used for such elongation conversions.

The Oliver formula can, in a simplified form, be expressed as

$$A_r = 1{,}74A \left(\frac{\sqrt{S_o}}{L_o}\right)^{0,4}$$

where

A_r is the required elongation on gauge length L_o;

A is the elongation on a gauge length of $4\sqrt{S_o}$.

This formula gives a direct conversion of elongation on $4\sqrt{S_o}$ to the equivalent for a test piece of cross-sectional area S_o, and a gauge length L_o. Expressed in terms of $5{,}65\sqrt{S_o}$, which is now regarded as the internationally accepted standard gauge length, it becomes

$$A_r = 2A \left(\frac{\sqrt{S_o}}{L_o}\right)^{0,4}$$

where A is the elongation on a gauge length of $5{,}65\sqrt{S_o}$.

Tables 1 to 10 and Charts 1, 2 and 3 have been prepared on the basis of the above formulae.

5 CONVERSION FROM ONE PROPORTIONAL GAUGE LENGTH TO ANOTHER PROPORTIONAL GAUGE LENGTH

Simple multiplying factors based on the formula are used for such conversions, and the relationships between a number of the more widely used proportional gauge lengths are given in Table 1. Detailed conversions of elongations obtained on $4\sqrt{S_o}$ to $5{,}65\sqrt{S_o}$ are given in Table 4.

6 CONVERSION FROM ONE NON-PROPORTIONAL GAUGE LENGTH TO ANOTHER NON-PROPORTIONAL GAUGE LENGTH FOR TEST PIECES OF EQUAL CROSS-SECTIONAL AREA

The conversion of elongation values of different fixed gauge lengths on test pieces of equal cross-sectional area are also made by simple factors. Conversion factors for metric gauge lengths of 50, 100, 150, 200 and 250 mm, and for inch gauge lengths of 2, 4, 6, 8 and 10 in are given in Table 2.

7 CONVERSION FROM A PROPORTIONAL GAUGE LENGTH TO A NON-PROPORTIONAL GAUGE LENGTH

The conversion factors are variable according to the cross-sectional area of the non-proportional test piece. Table 3 gives the multiplying factors for conversion from elongation on $5{,}65\sqrt{S_o}$ to the equivalent on fixed metric gauge lengths of 50, 100, 150 and 200 mm, and fixed inch gauge lengths of 2, 4, 6 and 8 in for a range of cross-sectional areas. For conversions in the reverse direction, i.e. elongation on a fixed gauge length to the equivalent on $5{,}65\sqrt{S_o}$, the reciprocal of the factor is used.

Examples :

a) Elongation of 20 % on $5{,}65\sqrt{S_o}$ is equivalent to $20 \times 1{,}139 = 22{,}78$ % on a 25 mm wide test piece of 6 mm thickness with a 50 mm gauge length (see Table 3).

b) Elongation of 25 % on a 40 mm $\times$ 10 mm test piece of 200 mm gauge length is equivalent to $25 \times 1/0{,}796 = 31{,}4$ % on $5{,}65\sqrt{S_o}$ (see Table 3).

From the examples shown it will be seen that conversions involving other proportional gauge lengths can be obtained by prior or subsequent use of the factors shown in Table 1.

Tables 5, 6 and 7 can be used to obtain some of these conversions.

Similarly, Tables 8, 9 and 10 can be used for conversions to $4\sqrt{S_o}$.

8 CONVERSION FROM A NON-PROPORTIONAL GAUGE LENGTH TO ANOTHER NON-PROPORTIONAL GAUGE LENGTH FOR TEST PIECES OF DIFFERENT CROSS-SECTIONAL AREAS

It is preferable for this calculation to be made in two stages with an initial conversion to $5{,}65\sqrt{S_o}$.

Example :

Elongation of 24 % on 200 mm for a 40 mm $\times$ 15 mm test piece in terms of equivalent on a 30 mm $\times$ 10 mm test piece with gauge lengths equal to 200 mm, 100 mm and 50 mm.

$24 \times 1/0{,}863 = 27{,}8$ % on $5{,}65\sqrt{S_o}$ (see Table 3).

and $27{,}8 \times 0{,}752 = 20{,}8$ % on 30 mm $\times$ 10 mm with 200 mm gauge length.

$27{,}8 \times 0{,}992 = 27{,}5$ % on 30 mm $\times$ 10 mm with 100 mm gauge length.

$27{,}8 \times 1{,}309 = 36{,}1$ % on 30 mm $\times$ 10 mm with 50 mm gauge length.

Elongation on other proportional gauge lengths can be obtained by using the factors given in Table 1.

9 USE OF CHARTS 1, 2 AND 3

9.1 Charts 1, 2 and 3 may be used as an alternative quick method to obtain elongation conversions.

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1) D.A. Oliver, Proc, Inst. Mech. E., Vol. 11 (1928), page 827.

9.2 Charts 1 and 2 may be used for conversions between $5,65\sqrt{S_o}$ or $4\sqrt{S_o}$ respectively and 50 mm (2 in) and 200 mm (8 in) gauge lengths.

Example :

To find the equivalent elongation on $5,65\sqrt{S_o}$ and $4\sqrt{S_o}$ to an elongation of 21 % on a 200 mm (8 in) gauge length of a 25 mm (1 in) $\times$ 12,5 mm (0.5 in) test piece.

Cross-sectional area = 312,5 mm² (0.5 in²).

The intersection of this ordinate with the abscissa representing an elongation of 21 % on a 200 mm (8 in) gauge length lies on the sloping line representing an elongation of 28 % on $5,65\sqrt{S_o}$ on Chart 1 and at a position relative to the sloping lines on Chart 2 approximating to an elongation of 32,2 on $4\sqrt{S_o}$.

Abscissae representing elongations on a 50 mm (2 in) gauge length appear on the left-hand side of the charts.

9.3 Chart 3 may be used for the calculation of all elongation conversions.

The Oliver formula may be re-written as

$$A_2 = A_1 \left(\frac{K_1}{K_2}\right)^{0,4} = \lambda_{1,2} \times A_1$$

where K_1 and K_2 designate the proportionality ratios of any two test pieces.

$$\left[K_1 = \frac{L_1}{\sqrt{S_1}} \text{ and } K_2 = \frac{L_o}{\sqrt{S_2}} \right]$$

Chart 3 shows the values of $\lambda_{1,2} = \left(\dfrac{K_1}{K_2}\right)^{0,4}$

To use Chart 3 it is necessary to perform the following operations :

a) calculate the values of proportionality $K_1 = \dfrac{L_1}{\sqrt{S_1}}$, and $K_2 = \dfrac{L_2}{\sqrt{S_2}}$, for two test pieces;

b) read graphically the coefficient $\lambda_{1,2} = \left(\dfrac{K_1}{K_2}\right)^{0,4}$;

c) the elongation obtained is $A_2 = \lambda_{1,2} \times A_1$.

3

TABLE 1 — Conversion factors : Proportional gauge lengths

Conversion from	Factor for conversion to						
	$4\sqrt{S_o}$	$5,65\sqrt{S_o}$	$8,16\sqrt{S_o}$	$11,3\sqrt{S_o}$	$4d$	$5d$	$8d$
$4\sqrt{S_o}$	1,000	0,870	0,752	0,661	0,953	0,870	0,721
$5,65\sqrt{S_o}$	1,149	1,000	0,863	0,759	1,093	1,000	0,828
$8,16\sqrt{S_o}$	1,330	1,158	1,000	0,879	1,268	1,158	0,960
$11,3\sqrt{S_o}$	1,514	1,317	1,137	1,000	1,443	1,317	1,091
$4d$	1,050	0,916	0,790	0,694	1,000	0,916	0,758
$5d$	1,149	1,000	0,863	0,759	1,093	1,000	0,828
$8d$	1,389	1,207	1,042	0,918	1,319	1,207	1,000

TABLE 2 — Conversion factors : Non-proportional gauge lengths
(Provided cross-sectional areas are the same)

a) Metric units

Conversion from	Factor for conversion to				
	50 mm	100 mm	150 mm	200 mm	250 mm
50 mm	1,000	0,758	0,644	0,574	0,525
100 mm	1,320	1,000	0,850	0,758	0,693
150 mm	1,552	1,176	1,000	0,891	0,815
200 mm	1,741	1,320	1,122	1,000	0,915
250 mm	1,904	1,443	1,227	1,093	1,000

b) Inch units

Conversion from	Factor for conversion to				
	2 in	4 in	6 in	8 in	10 in
2 in	1.000	0.758	0.644	0.574	0.525
4 in	1.320	1.000	0.850	0.758	0.693
6 in	1.552	1.176	1.000	0.891	0.815
8 in	1.741	1.320	1.122	1.000	0.915
10 in	1.904	1.443	1.227	1.093	1.000

TABLE 3 — Conversion factors from $5,65\sqrt{S_o}$
to non-proportional gauge lengths
(See also Chart 1)

Factors shown under "Non-proportional gauge lengths" give the value of

$$2\left(\frac{\sqrt{S_o}}{L}\right)^{0,4}$$

To convert from values on a gauge length of $5,65\sqrt{S_o}$ to a non-proportional gauge length, multiply by the appropriate factor.

To convert from values on a non-proportional gauge length to $5,65\sqrt{S_o}$, divide by the appropriate factor.

a) Metric units

Cross-sectional area of test piece mm^2	Factor for non-proportional gauge length of			
	200 mm	150 mm	100 mm	50 mm
5	0,331	0,372	0,437	0,577
10	0,381	0,427	0,502	0,653
15	0,413	0,463	0,545	0,719
20	0,437	0,491	0,577	0,761
25	0,457	0,513	0,603	0,796
30	0,474	0,532	0,626	0,826
35	0,489	0,549	0,645	0,852
40	0,502	0,564	0,663	0,875
45	0,514	0,577	0,679	0,896
50	0,525	0,589	0,693	0,915
55	0,535	0,601	0,706	0,932
60	0,545	0,611	0,719	0,949
70	0,562	0,630	0,741	0,978
80	0,577	0,647	0,761	1,005
90	0,591	0,663	0,780	1,029
100	0,603	0,677	0,796	1,051
110	0,615	0,690	0,812	1,071
120	0,626	0,702	0,826	1,090
130	0,636	0,713	0,839	1,107
140	0,645	0,724	0,852	1,124
150	0,654	0,734	0,863	1,139
160	0,663	0,744	0,875	1,154
170	0,671	0,753	0,885	1,168
180	0,679	0,761	0,896	1,182
190	0,686	0,770	0,905	1,195
200	0,693	0,778	0,915	1,207
210	0,700	0,785	0,924	1,219
220	0,706	0,793	0,932	1,230
230	0,713	0,800	0,941	1,241
240	0,719	0,807	0,949	1,252
250	0,725	0,813	0,956	1,262
260	0,730	0,820	0,964	1,272
270	0,736	0,826	0,971	1,281
280	0,741	0,832	0,978	1,291
290	0,747	0,838	0,985	1,300

TABLE 3 (*continued*)

Cross-sectional area of test piece	Factor for non-proportional gauge length of			
mm²	200 mm	150 mm	100 mm	50 mm
300	0,752	0,843	0,992	1,309
310	0,757	0,849	0,998	1,317
320	0,761	0,854	1,005	1,326
330	0,766	0,860	1,011	1,334
340	0,771	0,865	1,017	1,342
350	0,775	0,870	1,023	1,350
360	0,780	0,875	1,029	1,357
370	0,784	0,879	1,034	1,365
380	0,788	0,884	1,040	1,372
390	0,792	0,889	1,045	1,379
400	0,796	0,893	1,051	1,386
410	0,800	0,898	1,056	1,393
420	0,804	0,902	1,061	1,400
430	0,808	0,906	1,066	1,406
440	0,812	0,911	1,071	1,413
450	0,815	0,915	1,076	1,419
460	0,819	0,919	1,080	1,426
470	0,822	0,923	1,085	1,432
480	0,826	0,926	1,090	1,438
490	0,829	0,930	1,094	1,444
500	0,833	0,934	1,099	1,450
550	0,849	0,952	1,120	1,477
600	0,863	0,969	1,139	1,503
650	0,877	0,984	1,158	1,528
700	0,891	0,999	1,175	1,550
750	0,903	1,013	1,191	1,572
800	0,915	1,026	1,207	1,592
850	0,926	1,039	1,222	1,612
900	0,936	1,051	1,236	1,630
950	0,947	1,062	1,249	1,648
1 000	0,956	1,073	1,262	1,665
1 050	0,966	1,084	1,274	1,681
1 100	0,975	1,094	1,286	1,697
1 150	0,983	1,103	1,298	1,712
1 200	0,992	1,113	1,309	1,727
1 250	1,000	1,122	1,320	1,741
1 300	1,008	1,131	1,330	1,755
1 350	1,016	1,139	1,340	1,768
1 400	1,023	1,148	1,350	1,781
1 450	1,030	1,156	1,359	1,794
1 500	1,037	1,164	1,369	1,806
1 550	1,044	1,171	1,378	1,818
1 600	1,051	1,179	1,386	1,829
1 650	1,057	1,186	1,395	1,841
1 700	1,063	1,193	1,403	1,852
1 750	1,070	1,200	1,411	1,862
1 800	1,076	1,207	1,419	1,873
1 850	1,082	1,213	1,427	1,883
1 900	1,087	1,220	1,435	1,893
1 950	1,093	1,226	1,442	1,903

TABLE 3 (*continued*)

Cross-sectional area of test piece	Factor for non-proportional gauge length of			
mm²	200 mm	150 mm	100 mm	50 mm
2 000	1,099	1,233	1,450	1,913
2 050	1,104	1,239	1,457	1,922
2 100	1,109	1,245	1,464	1,931
2 150	1,115	1,250	1,471	1,941
2 200	1,120	1,256	1,477	1,950
2 250	1,125	1,262	1,484	1,958
2 300	1,130	1,267	1,491	1,967
2 350	1,135	1,273	1,497	1,975
2 400	1,139	1,278	1,503	1,984
2 450	1,144	1,284	1,510	1,992
2 500	1,149	1,289	1,516	2,000
2 550	1,153	1,294	1,522	2,008
2 600	1,158	1,299	1,528	2,016
2 650	1,162	1,304	1,533	2,023
2 700	1,167	1,309	1,539	2,031
2 750	1,171	1,314	1,545	2,038
2 800	1,175	1,318	1,550	2,046
2 850	1,179	1,323	1,556	2,053
2 900	1.183	1,328	1,561	2,060
2 950	1,187	1,332	1,567	2,067
3 000	1,191	1,337	1,572	2,074

b) **Inch units**

Cross-sectional area of test piece	Factor for non-proportional gauge length of			
in²	8 in	6 in	4 in	2 in
0.010	0.347	0.389	0.457	0.603
0.020	0.398	0.447	0.525	0.693
0.030	0.432	0.484	0.570	0.752
0.040	0.457	0.513	0.603	0.796
0.050	0.478	0.536	0.631	0.833
0.060	0.496	0.556	0.654	0.863
0.070	0.511	0.574	0.675	0.891
0.080	0.525	0.589	0.693	0.915
0.090	0.538	0.603	0.710	0.936
0.100	0.549	0.616	0.725	0.956
0.110	0.560	0.628	0.739	0.975
0.120	0.570	0.639	0.752	0.992
0.130	0.579	0.649	0.764	1.008
0.140	0.588	0.659	0.775	1.023
0.150	0.596	0.668	0.786	1.037
0.160	0.603	0.677	0.796	1.051
0.170	0.611	0.685	0.806	1.063
0.180	0.618	0.693	0.815	1.076
0.190	0.625	0.701	0.824	1.087
0.200	0.631	0.708	0.833	1.099

5

TABLE 3 (continued)

TABLE 3 (concluded)

Cross-sectional area of test piece	Factor for non-proportional gauge length of			
in²	8 in	6 in	4 in	2 in
0.210	0.637	0.715	0.841	1.109
0.220	0.643	0.722	0.849	1.120
0.230	0.649	0.728	0.856	1.130
0.240	0.654	0.734	0.863	1.139
0.250	0.660	0.740	0.871	1.149
0.260	0.665	0.746	0.877	1.158
0.270	0.670	0.752	0.884	1.167
0.280	0.675	0.757	0.891	1.175
0.290	0.680	0.763	0.897	1.183
0.300	0.684	0.768	0.903	1.191
0.310	0.689	0.773	0.909	1.199
0.320	0.693	0.778	0.915	1.207
0.330	0.697	0.782	0.920	1.214
0.340	0.702	0.787	0.926	1.222
0.350	0.706	0.792	0.931	1.229
0.360	0.710	0.796	0.936	1.236
0.370	0.714	0.801	0.942	1.242
0.380	0.717	0.805	0.947	1.249
0.390	0.721	0.809	0.952	1.256
0.400	0.725	0.813	0.956	1.262
0.410	0.728	0.817	0.961	1.268
0.420	0.732	0.821	0.966	1.274
0.430	0.735	0.825	0.970	1.280
0.440	0.739	0.829	0.975	1.286
0.450	0.742	0.833	0.979	1.292
0.460	0.745	0.836	0.983	1.298
0.470	0.749	0.840	0.988	1.303
0.480	0.752	0.843	0.992	1.309
0.490	0.755	0.847	0.996	1.314
0.500	0.758	0.850	1.000	1.320
0.550	0.772	0.867	1.019	1.345
0.600	0.786	0.882	1.037	1.369
0.650	0.799	0.896	1.054	1.391
0.700	0.811	0.909	1.070	1.411
0.750	0.822	0.922	1.084	1.431
0.800	0.833	0.934	1.099	1.450
0.850	0.843	0.945	1.112	1.467
0.900	0.852	0.956	1.125	1.484
0.950	0.862	0.967	1.137	1.500
1.000	0.871	0.977	1.149	1.516
1.050	0.879	0.986	1.160	1.531
1.100	0.887	0.996	1.171	1.545
1.150	0.895	1.004	1.181	1.559
1.200	0.903	1.013	1.191	1.572
1.250	0.910	1.021	1.201	1.585
1.300	0.917	1.029	1.211	1.597
1.350	0.924	1.037	1.220	1.609
1.400	0.931	1.045	1.229	1.621
1.450	0.938	1.052	1.237	1.633
1.500	0.944	1.059	1.246	1.644

Cross-sectional area of test piece	Factor for non-proportional gauge length of			
in²	8 in	6 in	4 in	2 in
1.550	0.950	1.066	1.254	1.655
1.600	0.956	1.073	1.262	1.665
1.650	0.962	1.080	1.270	1.675
1.700	0.968	1.086	1.277	1.685
1.750	0.974	1.092	1.285	1.695
1.800	0.979	1.099	1.292	1.705
1.850	0.985	1.105	1.299	1.714
1.900	0.990	1.111	1.306	1.723
1.950	0.995	1.116	1.313	1.732
2.000	1.000	1.122	1.320	1.741
2.050	1.005	1.128	1.326	1.750
2.100	1.010	1.133	1.332	1.758
2.150	1.015	1.138	1.339	1.766
2.200	1.019	1.144	1.345	1.775
2.250	1.024	1.149	1.351	1.783
2.300	1.028	1.154	1.357	1.790
2.350	1.033	1.159	1.363	1.798
2.400	1.037	1.164	1.369	1.806
2.450	1.041	1.168	1.374	1.813
2.500	1.046	1.173	1.380	1.821
2.550	1.050	1.178	1.385	1.828
2.600	1.054	1.182	1.391	1.835
2.650	1.058	1.187	1.396	1.842
2.700	1.062	1.191	1.401	1.849
2.750	1.066	1.196	1.406	1.856
2.800	1.070	1.200	1.411	1.862
2.850	1.073	1.204	1.416	1.869
2.900	1.077	1.209	1.421	1.875
2.950	1.081	1.213	1.426	1.882
3.000	1.084	1.217	1.431	1.888
3.050	1.088	1.221	1.436	1.894
3.100	1.092	1.225	1.440	1.901
3.150	1.095	1.229	1.445	1.907
3.200	1.099	1.233	1.450	1.913
3.250	1.102	1.236	1.454	1.919
3.300	1.105	1.240	1.459	1.925
3.350	1.109	1.244	1.463	1.930
3.400	1.112	1.248	1.467	1.936
3.450	1.115	1.251	1.472	1.942
3.500	1.188	1.255	1.476	1.947
3.550	1.122	1.258	1.480	1.953
3.600	1.125	1.262	1.484	1.958
3.650	1.128	1.265	1.488	1.964
3.700	1.131	1.269	1.492	1.969
3.750	1.134	1.272	1.496	1.974
3.800	1.137	1.276	1.500	1.980
3.850	1.140	1.279	1.504	1.985
3.900	1.143	1.282	1.508	1.990
3.950	1.146	1.286	1.512	1.995
4.000	1.149	1.289	1.516	2.000

TABLE 4 — Elongation values on 5,65 $\sqrt{S_o}$ corresponding to those obtained on 4 $\sqrt{S_o}$ gauge length

(Factor 0,87; rounded to nearest whole number)

Actual per cent elongation measured on 4 $\sqrt{S_o}$	0	1	2	3	4	5	6	7	8	9
	Corresponding per cent elongation on 5,65 $\sqrt{S_o}$									
10	9	10	10	11	12	13	14	15	16	17
20	17	18	19	20	21	22	23	23	24	25
30	26	27	28	29	30	30	31	32	33	34
40	35	36	37	37	38	39	40	41	42	43
50	43	44	45	46	47	48	49	50	50	51

TABLE 5a) — Elongation values on 5,65 $\sqrt{S_o}$ corresponding to those obtained on 50 mm gauge length

(Rounded to the nearest whole number)

Actual per cent elongation on 50 mm gauge length	Corresponding per cent elongation on 5,65 $\sqrt{S_o}$ gauge length if cross-sectional area in square millimetres is :																					
	5	10	20	40	60	80	100	150	200	250	300	400	500	600	700	800	900	1 000	1 200	1 500	2 000	2 500
18	31	27	24	21	19	18	17	16	15	14	14	13	12	12	12	11	11	11	10	10	9	9
19	33	29	25	22	20	19	18	17	16	15	15	14	13	13	12	12	12	11	11	11	10	10
20	35	30	26	23	21	20	19	18	17	16	15	14	14	13	13	13	12	12	12	11	10	10
21	36	32	28	24	22	21	20	18	17	17	16	15	14	14	14	13	13	13	12	12	11	11
22	38	33	29	25	23	22	21	19	18	17	17	16	15	15	14	14	13	13	13	12	12	11
23	40	35	30	26	24	23	22	20	19	18	18	17	16	15	15	14	14	14	13	13	12	12
24	42	36	32	27	25	24	23	21	20	19	18	17	17	16	15	15	15	14	14	13	13	12
25	43	38	33	29	26	25	24	22	21	20	19	18	17	17	16	16	15	15	14	14	13	13
26	45	39	34	30	27	26	25	23	22	21	20	19	18	17	17	16	16	16	15	14	14	13
27	47	41	35	31	28	27	26	24	22	21	21	19	19	18	17	17	17	16	16	15	14	14
28	49	42	37	32	30	28	27	25	23	22	21	20	19	19	18	18	17	17	16	16	15	14
29	50	44	38	33	31	29	28	25	24	23	22	21	20	19	18	18	18	17	17	16	15	15
30	52	45	39	34	32	30	29	26	25	24	23	22	21	20	19	19	18	18	17	17	16	15
31	54	47	41	35	33	31	30	27	26	25	24	22	21	21	20	19	19	19	18	17	16	16
32	55	48	42	37	34	32	30	28	27	25	24	23	22	21	21	20	20	19	19	18	17	16
33	57	50	43	38	35	33	31	29	27	26	25	24	23	22	21	21	20	20	19	18	17	17
34	59	51	45	39	36	34	32	30	28	27	26	25	23	23	22	21	21	20	20	19	18	17
35	61	53	46	40	37	35	33	31	29	28	27	25	24	23	23	22	21	21	20	19	18	18
36	62	54	47	41	38	36	34	32	30	29	28	26	25	24	23	23	22	22	21	20	19	18
37	64	56	49	42	39	37	35	32	31	29	28	27	26	25	24	23	23	22	21	20	19	19
38	66	57	50	43	40	38	36	33	31	30	29	27	26	25	25	24	23	23	22	21	20	19
39	68	59	51	45	41	39	37	34	32	31	30	28	27	26	25	24	24	23	23	22	20	20
40	69	60	53	46	42	40	38	35	33	32	31	29	28	27	26	25	25	24	23	22	21	20
41	71	62	54	47	43	41	39	36	34	32	31	30	28	27	26	26	25	25	24	23	21	21
42	73	63	55	48	44	42	40	37	35	33	32	30	29	28	27	26	26	25	24	23	22	21
43	75	65	56	49	45	43	41	38	36	34	33	31	30	29	28	27	26	26	25	24	22	22
44	76	66	58	50	46	44	42	39	36	35	34	32	30	29	28	28	27	26	25	24	23	22
45	78	68	59	51	47	45	43	39	37	36	34	32	31	30	29	28	28	27	26	25	24	23
46	80	69	60	53	48	46	44	40	38	36	35	33	32	31	30	29	28	28	27	25	24	23
47	81	71	62	54	50	47	45	41	39	37	36	34	32	31	30	30	29	28	27	26	25	24

TABLE 5b) — Elongation values on $5,65\sqrt{S_o}$ corresponding to those obtained
on 2 in gauge length
(Rounded to the nearest whole number)

Actual per cent elongation on 2 in gauge length	Corresponding per cent elongation on $5,65\sqrt{S_o}$ gauge length if cross-sectional area in square inches is :																					
	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.60	0.70	0.80	0.90	1.0	1.2	1.4	1.6	1.8	2.0	3.0	4.0
18	22	19	17	16	16	15	15	14	14	14	13	13	12	12	12	11	11	11	11	10	10	9
19	23	20	18	17	17	16	15	15	15	14	14	13	13	13	13	12	12	11	11	11	10	9
20	24	21	19	18	17	17	16	16	15	15	15	14	14	13	13	13	12	12	12	12	11	10
21	25	22	20	19	18	18	17	17	16	16	15	15	14	14	14	13	13	13	12	12	11	10
22	26	23	21	20	19	18	18	17	17	17	16	16	15	15	15	14	14	13	13	13	12	11
23	28	24	22	21	20	19	19	18	18	17	17	16	16	15	15	15	14	14	13	13	12	11
24	29	25	23	22	21	20	20	19	19	18	18	17	17	16	16	15	15	14	14	14	13	12
25	30	26	24	23	22	21	20	20	19	19	18	18	17	17	17	16	15	15	15	14	13	12
26	31	27	25	24	23	22	21	21	20	20	19	18	18	18	17	16	16	16	15	15	14	13
27	32	28	26	25	24	23	22	21	21	20	20	19	19	18	18	17	17	16	16	16	14	13
28	34	29	27	26	24	24	23	22	22	21	20	20	19	19	19	18	17	17	16	16	15	14
29	35	30	28	26	25	24	24	23	22	22	21	21	20	20	19	18	18	17	17	17	15	14
30	36	31	29	27	26	25	24	24	23	23	22	21	21	20	20	19	19	18	18	17	16	15
31	37	32	30	28	27	26	25	25	24	24	23	22	21	21	20	20	19	19	18	18	16	15
32	38	33	31	29	28	27	26	25	25	24	23	23	22	22	21	20	20	19	19	18	17	16
33	40	34	32	30	29	28	27	26	26	25	24	23	23	22	22	21	20	20	19	19	17	16
34	41	36	33	31	30	29	28	27	26	26	25	24	23	23	22	22	21	20	20	20	18	17
35	42	37	34	32	30	29	28	28	27	27	26	25	24	24	23	22	22	21	21	20	19	17
36	43	38	35	33	31	30	29	29	28	27	26	26	25	24	24	23	22	22	21	21	19	18
37	44	39	36	34	32	31	30	29	29	28	27	26	26	25	24	24	23	22	22	21	20	18
38	46	40	37	35	33	32	31	30	29	29	28	27	26	26	25	24	23	23	22	22	20	19
39	47	41	38	36	34	33	32	31	30	30	29	28	27	26	26	25	24	23	23	22	21	19
40	48	42	39	36	35	34	33	32	31	30	29	28	28	27	26	25	25	24	23	23	21	20
41	49	43	40	37	36	34	33	33	32	31	30	29	28	28	27	26	25	25	24	24	22	20
42	50	44	40	38	37	35	34	33	33	32	31	30	29	28	28	27	26	25	25	24	22	21
43	52	45	41	39	37	36	35	34	33	33	31	30	30	29	28	27	27	26	25	25	23	21
44	53	46	42	40	38	37	36	35	34	33	32	31	30	30	29	28	27	26	26	25	23	22
45		47	43	41	39	38	37	36	35	34	33	32	31	30	30	29	28	27	26	26	24	22
46		48	44	42	40	39	37	36	36	35	34	33	32	31	30	29	28	28	27	26	24	23
47		49	45	43	41	39	38	37	36	35	34	33	32	32	31	30	29	28	28	27	25	23

TABLE 6a) — Elongation values on $5,65\sqrt{S_o}$ corresponding to those obtained
on 100 mm gauge length
(Rounded to the nearest whole number)

Actual per cent elongation on 100 mm gauge length	Corresponding per cent elongation on $5,65\sqrt{S_o}$ gauge length if cross-sectional area in square millimetres is :																					
	5	10	20	40	60	80	100	150	200	250	300	400	500	600	700	800	900	1 000	1 200	1 500	2 000	2 500
18	41	36	31	27	25	24	23	21	20	19	18	17	16	16	15	15	15	14	14	13	12	12
19	43	38	33	29	26	25	24	22	21	20	19	18	17	17	16	16	15	15	15	14	13	13
20	46	40	35	30	28	26	25	23	22	21	20	19	18	18	17	17	16	16	15	15	14	13
21	48	42	36	32	29	28	26	24	23	22	21	20	19	18	18	17	17	17	16	15	14	14
22	50	44	38	33	31	29	28	25	24	23	22	21	20	19	19	18	18	17	17	16	15	15
23	53	46	40	35	32	30	29	27	25	24	23	22	21	20	20	19	19	18	18	17	16	15
24	55	48	42	36	33	32	30	28	26	25	24	23	22	21	20	20	19	19	18	18	17	16
25	57	50	43	38	35	33	31	29	27	26	25	24	23	22	21	21	20	20	19	18	17	16
26	59	52	45	39	36	34	33	30	28	27	26	25	24	23	22	22	21	21	20	19	18	17
27	62	54	47	41	38	35	34	31	30	28	27	26	25	24	23	22	22	21	21	20	19	18
28	64	56	49	42	39	37	35	32	31	29	28	27	25	25	24	23	23	22	21	20	19	18
29	66	58	50	44	40	38	36	34	32	30	29	28	26	25	25	24	23	23	22	21	20	19
30	69	60	52	45	42	39	38	35	33	31	30	29	27	26	26	25	24	24	23	22	21	20
31	71	62	54	47	43	41	39	36	34	32	31	30	28	27	26	26	25	25	24	23	21	20
32	73	64	55	48	45	42	40	37	35	33	32	30	29	28	27	27	26	25	24	23	22	21
33	75	66	57	50	46	43	41	38	36	35	33	31	30	29	28	27	37	26	25	24	23	22
34	78	68	59	51	47	45	43	39	37	36	34	32	31	30	29	28	28	27	26	25	23	22
35	80	70	61	53	49	46	44	41	38	37	35	33	32	31	30	29	28	28	27	26	24	23
36	82	72	62	54	50	47	45	42	39	38	36	34	33	32	31	30	29	29	28	26	25	24
37	85	74	64	56	51	49	46	43	40	39	37	35	34	32	31	31	30	29	28	27	26	24
38	87	76	66	57	53	50	48	44	42	40	38	36	35	33	32	31	31	30	29	28	26	25
39	89	78	68	59	54	51	49	45	43	41	39	37	36	34	33	32	32	31	30	28	27	26
40	91	80	69	60	56	53	50	46	44	42	40	38	36	35	34	33	32	32	31	29	28	26
41	94	82	71	62	57	54	51	47	45	43	41	39	37	36	35	34	33	32	31	30	28	27
42	96	84	73	63	58	55	53	49	46	44	42	40	38	37	36	35	34	33	32	31	29	28
43	98	86	75	65	60	56	54	50	47	45	43	41	39	38	37	36	35	34	33	31	30	28
44	101	88	76	66	61	58	55	51	48	46	44	42	40	39	37	36	36	35	34	32	30	29
45	103	90	78	68	63	59	57	52	49	47	45	43	41	39	38	37	36	36	34	33	31	30
46	105	92	80	69	64	60	58	53	50	48	46	44	42	40	39	38	37	36	35	34	32	30
47	107	94	81	71	65	62	59	54	51	49	47	45	43	41	40	39	38	37	36	34	32	31

TABLE 6b) — Elongation values on $5{,}65 \sqrt{S_o}$ corresponding to those obtained
on 4 in gauge length
(Rounded to the nearest whole number)

Actual per cent elongation on 4 in gauge length	Corresponding per cent elongation on $5{,}65 \sqrt{S_o}$ gauge length if cross-sectional area in square inches is :																					
	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.60	0.70	0.80	0.90	1.0	1.2	1.4	1.6	1.8	2.0	3.0	4.0
13	21	18	17	16	15	14	14	14	13	13	13	12	12	12	11	11	11	10	10	10	9	9
14	22	19	18	17	16	15	15	15	14	14	13	13	13	12	12	12	11	11	11	11	10	9
15	24	21	19	18	17	17	16	16	15	15	14	14	14	13	13	13	12	12	12	12	10	10
16	25	22	20	19	18	18	17	17	16	16	15	15	15	14	14	13	13	13	12	12	11	11
17	27	23	22	20	20	19	18	18	17	17	16	16	15	15	15	14	14	13	13	13	12	11
18	28	25	23	22	21	20	19	19	18	18	17	17	16	16	16	15	15	14	14	14	13	12
19	30	26	24	23	22	21	20	20	19	19	18	18	17	17	17	16	15	15	15	14	13	13
20	32	28	25	24	23	22	21	21	20	20	19	19	18	18	17	17	16	16	15	15	14	13
21	33	29	27	25	24	23	23	22	21	21	20	20	19	19	18	18	17	17	16	16	15	14
22	35	30	28	26	25	24	24	23	23	22	21	21	20	20	19	18	18	17	17	17	15	15
23	36	32	29	28	26	25	25	24	24	23	22	21	21	20	20	19	19	18	18	17	16	15
24	38	33	31	29	28	27	26	25	25	24	23	22	22	21	21	20	20	19	19	18	17	16
25	40	35	32	30	29	28	27	26	26	25	24	23	23	22	22	21	20	20	19	19	17	16
26	41	36	33	31	30	29	28	27	27	26	25	24	24	23	23	22	21	21	20	20	18	17
27	43	37	34	32	31	30	29	28	28	27	26	25	25	24	23	23	22	21	21	20	19	18
28	44	39	36	34	32	31	30	29	29	28	27	26	25	25	24	23	23	22	22	21	20	18
29	46	40	37	35	33	32	31	30	30	29	28	27	26	26	25	24	24	23	22	22	20	19
30	48	41	38	36	34	33	32	31	31	30	29	28	27	27	26	25	24	24	23	23	21	20
31	49	43	40	37	35	34	33	32	32	31	30	29	28	28	27	26	25	25	24	23	22	20
32	51	44	41	38	37	35	34	33	33	32	31	30	29	28	28	27	26	25	25	24	22	21
33	52	45	42	40	38	37	35	35	34	33	32	31	30	29	29	28	27	26	26	25	23	22
34		47	43	41	39	38	36	36	35	34	33	32	31	30	30	29	28	27	26	26	24	22
35		48	45	42	40	39	38	37	36	35	34	33	32	31	30	29	28	28	27	27	24	23
36		50	46	43	41	40	39	38	37	36	35	34	33	32	31	30	29	29	28	27	25	24
37		51	47	44	42	41	40	39	38	37	36	35	34	33	32	31	30	29	29	28	26	24
38		52	48	46	44	42	41	40	39	38	37	35	35	34	33	32	31	30	29	29	27	25
39			50	47	45	43	42	41	40	39	38	36	35	35	34	33	32	31	30	30	27	26
40			51	48	46	44	43	42	41	40	39	37	36	36	35	34	33	32	31	30	28	26
41			52	49	47	45	44	43	42	41	40	38	37	36	36	34	33	33	32	31	29	27
42				50	48	46	45	44	43	42	40	39	38	37	37	35	34	33	33	32	29	28

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TABLE 7a) — Elongation values on 5,65 $\sqrt{S_o}$ corresponding to those obtained on 200 mm gauge length

(Rounded to the nearest whole number)

Actual per cent elongation on 200 mm gauge length	Corresponding per cent elongation on 5,65 $\sqrt{S_o}$ gauge length if cross-sectional area in square millimetres is :																					
	5	10	20	40	60	80	100	150	200	250	300	400	500	600	700	800	900	1 000	1 200	1 500	2 000	2 500
18	54	47	41	36	33	31	30	28	26	25	24	23	22	21	20	20	19	19	18	17	16	16
19	57	50	43	38	35	33	31	29	27	26	25	24	23	22	21	21	20	20	19	18	17	17
20	60	53	46	40	37	35	33	31	29	28	27	25	24	23	22	22	21	21	20	19	18	17
21	63	55	48	42	39	36	35	32	30	29	28	26	25	24	24	23	22	22	21	20	19	18
22	66	58	50	44	40	38	36	34	32	30	29	28	26	25	25	24	23	23	22	21	20	19
23	69	60	53	46	42	40	38	35	33	32	31	29	28	27	26	25	25	24	23	22	21	20
24	72	63	55	48	44	42	40	37	35	33	32	30	29	28	27	26	26	25	24	23	22	21
25	75	66	57	50	46	43	41	38	36	34	33	31	30	29	28	27	27	26	25	24	23	22
26	78	68	59	52	48	45	43	40	38	36	35	33	31	30	29	28	28	27	26	25	24	23
27	81	71	62	54	50	47	45	41	39	37	36	34	32	31	30	30	29	28	27	26	25	24
28	84	74	64	56	51	49	46	43	40	39	37	35	34	32	31	31	30	29	28	27	25	24
29	87	76	66	58	53	50	48	44	42	40	39	36	35	34	33	32	31	30	29	28	26	25
30	91	79	69	60	55	52	50	46	43	41	40	38	36	35	35	33	32	31	30	29	27	26
31	94	81	71	62	57	54	51	47	45	43	41	39	37	36	35	34	33	32	31	30	28	27
32	97	84	73	64	59	55	53	49	46	44	43	40	38	37	36	35	34	33	32	31	29	28
33	100	87	75	66	61	57	55	50	48	46	44	41	40	38	37	36	35	35	33	32	30	29
34	103	89	78	68	62	59	56	52	49	47	45	43	41	39	38	37	36	36	34	33	31	30
35	106	92	80	70	64	61	58	53	50	48	47	44	42	41	39	38	37	37	35	34	32	30
36	109	95	82	72	66	62	60	55	52	50	48	45	43	42	40	39	38	38	36	35	33	31
37	112	97	85	74	68	64	61	57	53	51	49	46	44	43	42	40	40	39	37	36	34	32
38	115	100	87	76	70	66	63	58	55	52	51	48	46	44	43	42	41	40	38	37	35	33
39	118	102	89	78	72	68	65	60	56	54	52	49	47	45	44	43	42	41	39	38	36	34
40	121	105	91	80	73	69	66	61	58	55	53	50	48	46	45	44	43	42	40	39	36	35
41	124	108	94	82	75	71	68	63	59	57	55	51	49	47	46	45	44	43	41	40	37	36
42	127	110	96	84	77	73	70	64	61	58	56	53	50	49	47	46	45	44	42	40	38	37
43	130	113	98	86	79	75	71	66	62	59	57	54	52	50	48	47	46	45	43	41	39	37
44	133	116	101	88	81	76	73	67	63	61	59	55	53	51	49	48	47	46	44	42	40	38
45	136	118	103	90	83	78	75	69	65	62	60	57	54	52	51	49	48	47	45	43	41	39
46	139	121	105	92	84	80	76	70	66	63	61	58	55	53	52	50	49	48	46	44	42	40
47	142	123	107	94	86	81	78	72	68	65	63	59	56	54	53	51	50	49	47	45	43	41

TABLE 7b) — Elongation values on 5,65 $\sqrt{S_o}$ corresponding to those obtained
on 8 in gauge length
(Rounded to the nearest whole number)

Actual per cent elongation on 8 in gauge length	Corresponding per cent elongation on 5,65 $\sqrt{S_o}$ gauge length if cross-sectional area in square inches is :																					
	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.60	0.70	0.80	0.90	1.0	1.2	1.4	1.6	1.8	2.0	3.0	4.0
10	21	18	17	16	15	15	14	14	14	13	13	12	12	12	11	11	11	10	10	10	9	9
11	23	20	18	18	17	16	16	15	15	15	14	14	13	13	13	12	12	12	11	11	10	10
12	25	22	20	19	18	18	17	17	16	16	15	15	14	14	14	13	13	13	12	12	11	10
13	27	24	22	21	20	19	18	18	18	17	17	16	16	15	15	14	14	14	13	13	12	11
14	29	25	24	22	21	20	20	19	19	18	18	17	17	16	16	15	15	15	14	14	13	12
15	31	27	25	24	23	22	21	21	20	20	19	19	18	18	17	17	16	16	15	15	14	13
16	33	29	27	26	24	23	23	22	22	21	20	20	19	19	18	18	17	16	16	16	15	14
17	36	31	29	27	26	25	24	23	23	22	22	21	20	20	19	19	18	18	17	17	16	15
18	38	33	30	29	27	26	26	25	24	24	23	22	22	21	21	20	19	19	18	18	17	16
19	40	35	32	30	29	28	27	26	26	25	24	23	23	22	22	21	20	20	19	19	18	17
20	42	36	34	32	30	29	28	28	27	26	26	25	24	23	23	22	21	21	20	20	18	17
21	44	38	35	34	32	31	30	29	28	28	27	26	25	25	24	23	23	22	21	21	19	18
22	46	40	37	35	33	32	31	30	30	29	28	27	26	26	25	24	24	23	22	22	20	19
23	48	42	39	37	35	34	33	32	31	30	29	28	28	27	26	25	25	24	23	23	21	20
24	50	44	40	38	36	35	34	33	32	32	31	30	29	28	28	27	26	25	25	24	22	21
25	52	45	42	40	38	37	35	34	34	33	32	31	30	29	29	28	27	26	26	25	23	22
26		47	44	42	39	38	37	36	35	34	33	32	31	31	30	29	28	27	27	26	24	23
27		49	45	43	41	40	38	37	36	36	34	33	32	32	31	30	29	28	28	27	25	24
28		51	47	45	42	41	40	39	38	37	36	35	34	33	32	31	30	29	29	28	26	24
29		53	49	46	44	42	41	40	39	38	37	36	35	34	33	32	31	30	30	29	27	25
30			50	48	45	44	42	41	40	40	38	37	36	35	34	33	32	31	31	30	28	26
31			52	50	47	45	44	43	42	41	40	38	37	36	36	34	33	32	32	31	29	27
32				51	48	47	45	44	43	42	41	39	38	38	37	35	34	33	33	32	30	28
33				53	50	48	47	45	45	43	42	41	40	39	38	37	35	34	34	33	30	29
34					51	50	48	47	46	45	43	42	41	40	39	38	36	36	35	34	31	30
35					53	51	50	48	47	46	45	43	42	41	40	39	38	37	36	35	32	31
36						53	51	50	48	47	46	44	43	42	41	40	39	38	37	36	33	32
37							52	51	50	49	47	46	44	43	42	41	40	39	38	37	34	33
38								52	51	50	48	47	46	45	44	42	41	40	39	38	35	34
39									53	51	50	48	47	46	45	43	42	41	40	39	36	35

TABLE 8a) —Elongation values on 4 $\sqrt{S_o}$ corresponding to those obtained
on 50 mm gauge length
(Rounded to the nearest whole number)

Actual per cent elongation on 50 mm gauge length	Corresponding per cent elongation on 4 $\sqrt{S_o}$ gauge length if cross-sectional area in square millimetres is :																					
	5	10	20	40	60	80	100	150	200	250	300	400	500	600	700	800	900	1 000	1 200	1 500	2 000	2 500
18	36	31	27	24	22	21	20	18	17	16	16	15	14	14	13	13	13	12	12	11	11	10
19	38	33	29	25	23	22	21	19	18	17	17	16	15	15	14	14	13	13	13	12	11	11
20	40	35	30	26	24	23	22	20	19	18	18	17	16	15	15	14	14	14	13	13	12	11
21	42	36	32	28	25	24	23	21	20	19	18	17	17	16	16	15	15	14	14	13	13	12
22	44	38	33	29	27	25	24	22	21	20	19	18	17	17	16	16	16	15	15	14	13	13
23	46	40	35	30	28	26	25	23	22	21	20	19	18	18	17	17	16	16	15	15	14	13
24	48	42	36	32	29	27	26	24	23	22	21	20	19	18	18	17	17	17	16	15	14	14
25	50	43	38	33	30	29	27	25	24	23	22	21	20	19	19	18	18	17	17	16	15	14
26	52	45	39	34	32	30	28	26	25	24	23	22	21	20	19	19	18	18	17	17	16	15
27	54	47	41	35	33	31	30	27	26	25	24	22	21	21	20	19	19	19	18	17	16	16
28	56	49	42	37	34	32	31	28	27	26	25	23	22	21	21	20	20	19	19	18	17	16
29	58	50	44	38	35	33	32	29	28	26	25	24	23	22	21	20	20	19	18	17	17	16
30	60	52	45	39	36	34	33	30	29	27	26	25	24	23	22	22	21	21	20	19	18	17
31	62	54	47	41	38	35	34	31	30	28	27	26	25	24	23	22	22	21	21	20	19	18
32	64	55	48	42	39	37	35	32	30	29	28	27	25	24	23	23	22	21	20	19	18	18
33	66	57	50	43	40	38	36	33	31	30	29	27	26	25	24	24	23	23	22	21	20	19
34	68	59	51	45	41	39	37	34	32	31	30	28	27	26	25	25	24	23	23	22	20	20
35	70	61	53	46	42	40	38	35	33	32	31	29	28	27	26	25	25	24	23	22	21	20
36	72	62	54	47	44	41	39	36	34	33	32	30	29	28	27	26	25	25	24	23	22	21
37	74	64	56	49	45	42	40	37	35	34	32	31	29	28	27	27	26	26	25	24	22	21
38	76	66	57	50	46	43	42	38	36	35	33	32	30	29	28	27	27	26	25	24	23	22
39	78	68	59	51	47	45	43	39	37	36	34	32	31	30	29	28	27	27	26	25	23	22
40	80	69	60	53	48	46	44	40	38	36	35	33	32	31	30	29	28	28	27	25	24	23
41	82	71	62	54	50	47	45	41	39	37	36	34	33	31	30	30	29	28	27	26	25	24
42	84	73	63	55	51	48	46	42	40	38	37	35	33	32	31	30	30	29	28	27	25	24
43	86	75	65	57	52	49	47	43	41	39	38	36	34	33	32	31	30	30	29	27	26	25
44	88	76	66	58	53	50	48	44	42	40	39	36	35	34	33	32	31	30	29	28	26	25
45	90	78	68	59	55	51	49	45	43	41	40	37	36	34	33	32	32	31	30	29	27	26
46	92	80	69	60	56	53	50	46	44	42	40	38	36	35	34	33	32	32	31	29	28	26
47	94	81	71	62	57	54	51	47	45	43	41	39	37	36	35	34	33	32	31	30	28	27

TABLE 8b) — Elongation values on $4\sqrt{S_o}$ corresponding to those obtained
on 2 in gauge length
(Rounded to the nearest whole number)

Actual per cent elongation on 2 in gauge length	Corresponding per cent elongation on $4\sqrt{S_o}$ gauge length if cross-sectional area in square inches is :																					
	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.60	0.70	0.80	0.90	1.0	1.2	1.4	1.6	1.8	2.0	3.0	4.0
18	25	22	20	19	18	17	17	16	16	16	15	15	14	14	14	13	13	12	12	12	11	10
19	26	23	21	20	19	18	18	17	17	17	16	15	15	15	14	14	13	13	13	13	12	11
20	28	24	22	21	20	19	19	18	18	17	17	16	16	15	15	15	14	14	13	13	12	11
21	29	25	23	22	21	20	20	19	19	18	18	17	17	16	16	15	15	14	14	14	13	12
22	30	26	24	23	22	21	21	20	20	19	18	18	17	17	17	16	16	15	15	14	13	13
23	32	28	26	24	23	22	21	21	20	20	19	19	18	18	17	17	16	16	15	15	14	13
24	33	29	27	25	24	23	22	22	21	21	20	20	19	19	18	18	17	16	16	16	15	14
25	35	30	28	26	25	24	23	23	22	22	21	20	20	19	19	18	18	17	17	16	15	14
26	36	31	29	27	26	25	24	24	23	23	22	21	21	20	20	19	18	18	18	17	16	15
27	37	32	30	28	27	26	25	25	24	23	23	22	21	21	20	20	19	19	18	18	16	15
28	39	34	31	29	28	27	26	26	25	24	23	23	22	22	21	20	20	19	19	18	17	16
29	40	35	32	30	29	28	27	26	26	25	24	24	23	22	22	21	21	20	20	19	18	17
30	42	36	33	31	30	29	28	27	27	26	25	24	24	23	23	22	21	21	20	20	18	17
31	43	37	34	32	31	30	29	28	27	27	26	25	25	24	23	23	22	21	21	20	19	18
32	44	38	35	34	32	31	30	29	28	28	27	26	26	25	24	23	23	22	22	21	19	18
33	46	40	37	35	33	32	31	30	29	29	28	27	26	26	25	24	23	23	22	22	20	19
34	47	41	38	36	34	33	32	31	30	30	29	28	27	26	26	25	24	23	23	22	21	20
35	48	42	39	37	35	34	33	32	31	30	29	28	28	27	26	26	25	24	24	23	21	20
36	50	43	40	38	36	35	34	33	32	31	30	29	28	28	27	26	25	25	24	24	22	21
37	51	44	41	39	37	36	35	34	33	32	31	30	29	29	28	27	26	25	25	24	22	21
38	53	46	42	40	38	37	35	35	34	33	32	31	30	29	29	28	27	26	26	25	23	22
39	54	47	43	41	39	38	36	36	35	34	33	32	31	30	29	29	28	27	26	26	24	22
40	55	48	44	42	40	38	37	36	35	35	34	33	32	31	30	29	28	28	27	26	25	23
41	57	49	45	43	41	39	38	37	36	36	34	33	32	32	31	30	29	28	28	27	25	24
42	58	50	47	44	42	40	39	38	37	37	35	34	33	32	32	31	30	29	28	28	26	24
43	60	52	48	45	43	41	40	39	38	37	36	35	34	33	32	31	30	30	29	28	26	25
44	61	53	49	46	44	42	41	40	39	38	37	36	35	34	33	32	31	30	30	29	27	25
45		54	50	47	45	43	42	41	40	39	38	37	36	35	34	33	32	31	30	30	27	26
46		55	51	48	46	44	43	42	41	40	39	37	36	36	35	34	33	32	31	30	28	26
47		56	52	49	47	45	44	43	42	41	39	38	37	36	36	34	33	32	32	31	28	27

TABLE 9a) — Elongation values on $4\sqrt{S_o}$ corresponding to those obtained
on 100 mm gauge length
(Rounded to the nearest whole number)

Actual per cent elongation on 100 mm gauge length	Corresponding per cent elongation on $4\sqrt{S_o}$ gauge length if cross-sectional area in square millimetres is :																					
	5	10	20	40	60	80	100	150	200	250	300	400	500	600	700	800	900	1 000	1 200	1 500	2 000	2 500
18	47	41	36	31	29	27	26	24	23	22	21	20	19	18	18	17	17	16	16	15	14	14
19	50	43	38	33	30	29	27	25	24	23	22	21	20	19	19	18	18	17	17	16	15	14
20	53	46	40	35	32	30	29	27	25	24	23	22	21	20	20	19	19	18	18	17	16	15
21	55	48	42	36	34	32	30	28	26	25	24	23	22	21	21	20	20	19	18	18	17	16
22	58	50	44	38	35	33	32	29	28	26	25	24	23	22	22	21	20	20	19	18	17	17
23	60	53	46	40	37	35	33	31	29	28	27	25	24	23	22	22	21	21	20	19	18	17
24	63	55	48	42	38	36	35	32	30	29	28	26	25	24	23	23	22	22	21	20	19	18
25	66	57	50	43	40	38	36	33	31	30	29	27	26	25	24	24	23	23	22	21	20	19
26	68	59	52	45	42	39	38	35	33	31	30	28	27	26	25	25	24	24	23	22	21	20
27	71	62	54	47	43	41	39	36	34	32	31	30	28	27	26	26	25	25	24	23	21	20
28	74	64	56	49	45	42	40	37	35	34	32	31	29	28	27	27	26	26	25	24	22	21
29	76	66	58	50	46	44	42	39	36	35	34	32	30	29	28	28	27	26	25	24	23	22
30	79	69	60	52	48	45	43	40	38	36	35	33	31	30	29	29	28	27	26	25	24	23
31	81	71	62	54	50	47	45	41	39	37	36	34	32	31	30	30	29	28	27	26	25	24
32	84	73	64	55	51	48	46	43	40	38	37	35	33	32	31	30	30	29	28	27	25	24
33	87	76	66	57	53	50	48	44	41	40	38	36	35	33	32	31	31	30	29	28	26	25
34	89	78	68	59	54	51	49	45	43	41	39	37	36	34	33	32	32	31	30	29	27	26
35	92	80	70	61	56	53	51	47	44	42	41	38	37	35	34	33	33	32	31	29	28	27
36	95	82	72	62	58	54	52	48	45	43	42	39	38	36	35	34	33	33	32	30	29	27
37	97	85	74	64	59	56	53	49	46	44	43	40	39	37	36	35	34	34	32	31	29	28
38	100	87	76	66	61	57	55	51	48	46	44	42	40	38	37	36	35	35	33	32	30	29
39	102	89	78	68	62	59	56	52	49	47	45	43	41	39	38	37	36	36	34	33	31	30
40	105	92	80	69	64	60	58	53	50	48	46	44	42	40	39	38	37	36	35	34	32	30
41	108	94	82	71	66	62	59	55	52	49	48	45	43	41	40	39	38	37	36	34	33	31
42	110	96	84	73	67	63	61	56	53	50	49	46	44	42	41	40	39	38	37	35	33	32
43	113	98	86	75	69	65	62	57	54	52	50	47	45	43	42	41	40	39	38	36	34	33
44	116	101	88	76	70	66	64	59	55	53	51	48	46	44	43	42	41	40	39	37	35	33
45	118	103	90	78	72	68	65	60	57	54	52	49	47	45	44	43	42	41	40	38	36	34
46	121	105	92	80	74	69	66	61	58	55	53	50	48	46	45	44	43	42	40	39	36	35
47	124	108	94	81	75	71	68	63	59	56	54	51	49	47	46	45	44	43	41	39	37	36

TABLE 9b) — Elongation values on $4\sqrt{S_0}$ corresponding to those obtained on 4 in gauge length

(Rounded to the nearest whole number)

Actual per cent elongation on 4 in gauge length	Corresponding per cent elongation on $4\sqrt{S_0}$ gauge length if cross-sectional area in square inches is :																					
	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.60	0.70	0.80	0.90	1.0	1.2	1.4	1.6	1.8	2.0	3.0	4.0
13	24	21	19	18	17	17	16	16	15	15	14	14	14	13	13	13	12	12	12	11	10	10
14	26	23	20	19	18	18	17	17	16	16	15	15	15	14	14	13	13	13	12	12	11	11
15	27	24	22	21	20	19	18	18	18	17	17	16	16	15	15	14	14	14	13	13	12	11
16	29	26	23	22	21	20	20	19	19	18	18	17	17	16	16	15	15	15	14	14	13	12
17	31	28	25	24	22	22	21	20	20	20	19	18	18	17	17	16	16	15	15	15	14	13
18	33	29	26	25	24	23	22	22	21	21	20	19	19	18	18	17	17	16	16	16	14	14
19	35	31	28	26	25	24	23	23	22	22	21	20	20	20	19	18	18	17	17	17	15	14
20	36	33	29	28	26	25	25	24	24	23	22	21	21	21	20	19	19	18	18	17	16	15
21	38	34	31	29	28	27	26	25	25	24	23	22	22	22	21	20	20	19	19	18	17	16
22	40	36	32	30	29	28	27	26	26	25	24	23	23	23	22	21	21	20	20	19	18	17
23	42	37	34	32	30	29	28	28	27	26	25	24	24	24	23	22	22	21	20	20	18	17
24	44	39	35	33	32	31	30	29	28	28	26	25	25	25	24	23	22	22	21	21	19	18
25	46	41	37	35	33	32	31	30	29	29	28	27	26	25	25	24	23	23	22	22	20	19
26	47	42	38	36	34	33	32	31	31	30	29	28	27	27	26	25	24	24	23	23	21	20
27	49	44	39	37	36	34	33	32	32	31	30	29	28	28	27	26	25	25	24	24	22	20
28	51	46	41	39	37	36	35	34	33	32	31	30	29	29	28	27	26	26	25	24	22	21
29	53	47	42	40	38	37	36	35	34	33	32	31	30	30	29	28	27	26	26	25	23	22
30	55	49	44	42	40	38	37	36	35	34	33	32	31	31	30	29	28	27	27	26	24	23
31	56	51	45	43	41	39	38	37	36	35	34	33	32	32	31	30	29	28	28	27	25	23
32	58	52	47	44	42	41	39	38	38	37	35	34	34	33	32	31	30	29	28	28	26	24
33	60	54	48	46	44	42	41	40	39	38	36	35	35	34	33	32	31	30	29	29	27	25
34		55	50	47	45	43	42	41	40	39	38	36	36	35	34	33	32	31	30	30	27	26
35		57	51	48	46	45	43	42	41	40	39	37	37	36	35	33	33	32	31	30	28	27
36		59	53	50	48	46	44	43	42	41	40	38	38	37	36	34	34	33	32	31	29	27
37		60	54	51	49	47	46	44	43	42	41	39	39	38	37	35	35	34	33	32	30	28
38			56	53	50	48	47	46	45	44	42	40	40	39	38	36	36	35	34	33	31	29
39			57	54	51	50	48	47	46	45	43	41	41	40	39	37	36	36	35	34	31	30
40			58	55	53	51	49	48	47	46	44	42	42	41	40	38	37	36	36	35	32	30
41			60	57	54	52	51	49	48	47	45	44	43	42	41	39	38	37	37	36	33	31
42			61	58	55	53	52	50	49	48	46	45	44	43	42	40	39	38	37	36	34	32