

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 3

PREFERRED NUMBERS SERIES OF PREFERRED NUMBERS

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FOREWORD

This ISO Recommendation R3 was prepared by Technical Committee ISO/TC 19 — Preferred Numbers, the Secretariat of which is held by the Association Française de Normalisation (AFNOR).

From the time of its creation this Technical Committee has been engaged in the study of the subject of this recommendation, taking into account ISA Bulletin No. 11—Preferred numbers, which was issued by the former International Federation of the National Standardizing Associations (ISA).

During its first meeting in Paris in June 1949, the Technical Committee decided to complete the table in ISA Bulletin No. 11 by a series R 80.

The Secretariat of the Technical Committee prepared three successive draft proposals, the second of which was discussed by Sub-Committee ISO/TC 19/SC 1 during its first meeting (Paris, October 1950).

The third draft proposal, circulated in April 1951, was adopted by the Technical Committee by correspondence as a Draft ISO Recommendation.

This Draft ISO Recommendation (No. 7) was submitted on 31 October 1951 to all ISO Member Bodies, and received the approval of the majority.

At its second plenary meeting (New York, June 1952) and its third plenary meeting (The Hague, May 1953) the Technical Committee examined the comments submitted by various Member Bodies and amended the Draft slightly. The revised text, which forms the present Recommendation, was circulated to all ISO Member Bodies on 24 June 1953.

The following 25 Member Bodies approved Draft ISO Recommendation No. 7 in its revised form:

Australia	India	Spain
Austria	Israel	Sweden
Belgium	Italy	Switzerland
Chile	Mexico	Union of South Africa
Denmark	Netherlands	United Kingdom
Finland	New Zealand	U.S.A.
France	Norway	U.S.S.R.
Germany	Portugal	Yugoslavia
Hungary		

During its Meeting in Geneva from 7 to 10 July 1953, the ISO Council decided to accept the revised text as an ISO RECOMMENDATION (Resolution No. 7, Council 1953).

In September 1953, this Recommendation was also accepted by Canada.

PREFERRED NUMBERS - SERIES OF PREFERRED NUMBERS

1. BASIC SERIES OF PREFERRED NUMBERS

Basic series				Serial number	Theoretical values		Percentage differences between basic series and calculated values
R 5	R 10	R 20	R 40		Mantissae of logarithms	Calculated values	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.00	1.00	1.00	1.00	0	000	1.0000	0
			1.06	1	025	1.0593	+ 0.07
		1.12	1.12	2	050	1.1220	— 0.18
			1.18	3	075	1.1885	— 0.71
	1.25	1.25	1.25	4	100	1.2589	— 0.71
			1.32	5	125	1.3335	— 1.01
		1.40	1.40	6	150	1.4125	— 0.88
			1.50	7	175	1.4962	+ 0.25
1.60	1.60	1.60	1.60	8	200	1.5849	+ 0.95
			1.70	9	225	1.6788	+ 1.26
		1.80	1.80	10	250	1.7783	+ 1.22
			1.90	11	275	1.8836	+ 0.87
	2.00	2.00	2.00	12	300	1.9953	+ 0.24
			2.12	13	325	2.1135	+ 0.31
		2.24	2.24	14	350	2.2387	+ 0.06
			2.36	15	375	2.3714	— 0.48
2.50	2.50	2.50	2.50	16	400	2.5119	— 0.47
			2.65	17	425	2.6607	— 0.40
		2.80	2.80	18	450	2.8184	— 0.65
			3.00	19	475	2.9854	+ 0.49
	3.15	3.15	3.15	20	500	3.1623	— 0.39
			3.35	21	525	3.3497	+ 0.01
		3.55	3.55	22	550	3.5481	+ 0.05
			3.75	23	575	3.7584	— 0.22
4.00	4.00	4.00	4.00	24	600	3.9811	+ 0.47
			4.25	25	625	4.2170	+ 0.78
		4.50	4.50	26	650	4.4668	+ 0.74
			4.75	27	675	4.7315	+ 0.39
	5.00	5.00	5.00	28	700	5.0119	— 0.24
			5.30	29	725	5.3088	— 0.17
		5.60	5.60	30	750	5.6234	— 0.42
			6.00	31	775	5.9566	+ 0.73
6.30	6.30	6.30	6.30	32	800	6.3096	— 0.15
			6.70	33	825	6.6834	+ 0.25
		7.10	7.10	34	850	7.0795	+ 0.29
			7.50	35	875	7.4989	+ 0.01
	8.00	8.00	8.00	36	900	7.9433	+ 0.71
			8.50	37	925	8.4140	+ 1.02
		9.00	9.00	38	950	8.9125	+ 0.98
			9.50	39	975	9.4406	+ 0.63
10.00	10.00	10.00	10.00	40	000	10.0000	0

2. EXCEPTIONAL R 80 SERIES

1.00	1.80	3.15	5.60
1.03	1.85	3.25	5.80
1.06	1.90	3.35	6.00
1.09	1.95	3.45	6.15
1.12	2.00	3.55	6.30
1.15	2.06	3.65	6.50
1.18	2.12	3.75	6.70
1.22	2.18	3.87	6.90
1.25	2.24	4.00	7.10
1.28	2.30	4.12	7.30
1.32	2.36	4.25	7.50
1.36	2.43	4.37	7.75
1.40	2.50	4.50	8.00
1.45	2.58	4.62	8.25
1.50	2.65	4.75	8.50
1.55	2.72	4.87	8.75
1.60	2.80	5.00	9.00
1.65	2.90	5.15	9.25
1.70	3.00	5.30	9.50
1.75	3.07	5.45	9.75

3. COMMENTARY

- 3.1 Definition of preferred numbers.** Preferred numbers are the conventionally rounded off term values of geometrical series, including the integral powers of 10 and having as ratios the following factors:

$$\sqrt[5]{10} \quad \sqrt[10]{10} \quad \sqrt[20]{10} \quad \sqrt[40]{10} \quad \text{and} \quad \sqrt[80]{10}$$

in accordance with the tables in paragraphs 1 and 2 set out for the 1 to 10 range. The series of preferred numbers being unlimited in both directions, the values of the terms in other decimal ranges are obtained by multiplying the values in the tables by positive or negative integral powers of 10.

3.2 Terminology**3.2.1 Theoretical values :**

The extended term value of $(\sqrt[5]{10})^N$, $(\sqrt[10]{10})^N$, etc.

3.2.2 Calculated values (see paragraph 1, column 7) :

Values approximating to the theoretical values, expressed to 5 significant figures (the relative error in comparison with the theoretical values is less than 1/20 000).

3.2.3 Preferred numbers :

Values rounded off in accordance with columns R 5, R 10, R 20, R 40 and R 80 (see paragraph 1, columns 1 to 4 and paragraph 2).

3.2.4 Serial numbers :

An arithmetic series of consecutive numbers indicating the preferred numbers starting with 0 for the preferred number 1.00.

3.3 Designation of series. All series of preferred numbers have a designation commencing with the letter R.

3.4 Basic series. The series figuring in paragraph 1 are those which should be normally used. They are distinguished by the symbols:

R 5 — R 10 — R 20 — R 40

The values of the R 5 series are to be given preference over those of the R 10 series, and these latter over the values of the R 20 series and finally these last over those of the R 40 series.

The above symbols suffice if the series is not limited in either direction. If this is not so, the following method of expression is used to indicate the limits:

R 10 (1.25.....) series limited to the term value 1.25 (inclusive) as the low limit.

R 20 (..... 45) series limited to the term value 45 (inclusive) as the high limit.

R 40 (75 ... 300) series limited between the term values 75 and 300 (both values inclusive).

3.5 Exceptional R 80 series. This is set out in paragraph 2. The terms of the basic series should be given preference over the terms of the R 80 series.

3.6 Derived series.

3.6.1 *Series obtained by taking every second, third, fourth or p^{th} term of a basic series.* These are distinguished by the symbol of the corresponding basic series followed by the solidus division sign and the number 2, 3, 4... or p . If the series is limited, the symbol should include an indication of the limiting terms to be considered; if it is not limited, mention should be made of at least one of the terms.

Examples: R 5/2 (1... 1 000 000) — Series limited by the terms 1 and 1 000 000 and including both these terms.

R 10/3 (..... 80) — Series unlimited in both directions and including the term 80.

R 20/4 (112) — Series limited in the lower direction to 112 inclusive.

R 40/5 (..... 60) — Series limited in the upper direction to 60 inclusive.

Note: The derived series R 10/3 (1...), which is obtained, from 1, by taking every third term of the series R 10, comprises the following terms: 1, 2, 4, 8, 16, 31.5, ... Its ratio is about 2.