

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 17

GUIDE TO THE USE OF PREFERRED NUMBERS AND OF SERIES OF PREFERRED NUMBERS

1st EDITION

April 1956

COPYRIGHT RESERVED

The copyright of ISO Recommendations and ISO Standards belongs to ISO Member Bodies. Reproduction of these documents, in any country, may be authorized therefore only by the national standards organization of that country, being a member of ISO.

For each individual country the only valid standard is the national standard of that country.

Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organization.

BRIEF HISTORY

The ISO Recommendation R 17 was drawn up by the Technical Committee ISO/TC 19, *Preferred Numbers*, the Secretariat of which is held by the Association Française de Normalisation (AFNOR).

At the time when the Committee drew up the ISO Recommendation R 3, *Preferred Numbers - Series of Preferred Numbers*, it appeared necessary to provide the ISO Member Bodies with a guide for the use they would be making of preferred numbers. The work was undertaken in 1949.

Following the Committee's first meeting, held in Paris in June 1949, the Secretariat of the Committee drew up two successive draft proposals, the second of which, distributed in April 1951, was adopted by the Committee, by correspondence, as a Draft ISO Recommendation.

The Draft ISO Recommendation was submitted on 31 October 1951 to all the ISO Member Bodies and approved without reserve by 16 Member Bodies.

Nevertheless, in consideration of comments submitted by certain Member Bodies, the Committee decided, at its second plenary meeting (New York, June 1952) and its third plenary meeting (The Hague, May 1953), to make some improvements in the text of the Draft and to add to it a new section No. 5, giving examples of application, and a section No. 6, relating to the rounding-off of preferred numbers.

The text of the second Draft ISO Recommendation (finally revised at the Committee's fourth meeting, held in Paris in July 1954) was submitted to all the ISO Member Bodies in November 1954 and approved by the following 26 (out of a total of 34) Member Bodies:

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

The Secretariat took into consideration certain purely editorial comments submitted by two Member Bodies, and the Draft, amended accordingly, was submitted on 31 August 1955 to the ISO Council, which decided by correspondence to accept it as an ISO RECOMMENDATION, subject to certain final editorial amendments.

FOREWORD

Preferred numbers were first utilized in France at the end of the nineteenth century. From 1877 to 1879, Captain Charles RENARD, an officer in the engineer corps, made a rational study of the elements necessary in the construction of lighter-than-air aircraft. He computed the specifications for cotton rope according to a grading system, such that this element could be produced in advance without prejudice to the installations where such rope was subsequently to be utilized. Recognizing the advantage to be derived from the geometrical progression, he adopted, as a basis, a rope having a mass of a grammes per metre, and as a grading system, a rule that would yield a tenth multiple of the value a after every fifth step of the series, i.e.:

$$a \times q^5 = 10 a \quad \text{or} \quad q = \sqrt[5]{10}$$

whence the following numerical series:

$$a \quad a \sqrt[5]{10} \quad a \left(\sqrt[5]{10}\right)^2 \quad a \left(\sqrt[5]{10}\right)^3 \quad a \left(\sqrt[5]{10}\right)^4 \quad 10 a$$

the values of which, to 5 significant figures, are:

$$a \quad 1.5849 a \quad 2.5119 a \quad 3.9811 a \quad 6.3096 a \quad 10 a$$

RENARD's theory was to substitute for the above values, more rounded but more practical values, and he adopted as a a power of 10, positive, nil or negative. He thus obtained the following series:

$$10 \quad 16 \quad 25 \quad 40 \quad 63 \quad 100$$

which may be continued in both directions.

From this series, designated by the symbol R 5, the R 10, R 20, R 40 series were formed, each adopted ratio being the square root of the preceding one:

$$\sqrt[10]{10} \quad \sqrt[20]{10} \quad \sqrt[40]{10}$$

The first standardization drafts were drawn up on these bases in Germany by the Normenausschuss der Deutschen Industrie on 13 April 1920, and in France by the Commission permanente de standardisation in document X of 19 December 1921. These two documents offering few differences, the commission of standardization in the Netherlands proposed their unification. An agreement was reached in 1931 and in June 1932, the International Federation of the National Standardizing Associations organized an international meeting in Milan, where the ISA Technical Committee 32, *Preferred Numbers*, was set up and its Secretariat assigned to France.

On 19 September 1934, the ISA Technical Committee 32 held a meeting in Stockholm; sixteen nations were represented: Austria, Belgium, Czechoslovakia, Denmark, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Poland, Spain, Sweden, Switzerland, U.S.S.R.

With the exception of the Spanish, Hungarian and Italian delegations which, although favourable, had not thought fit to give their final agreement, all the other delegations accepted the draft which was presented. Furthermore, Japan communicated by letter its approval of the draft as already discussed in Milan. As a consequence of this, the international recommendation was laid down in ISA Bulletin 11 (December 1935).

After the Second World War, the work was resumed by ISO. The Technical Committee ISO/TC 19, *Preferred Numbers*, was set up and France again held the Secretariat. This Committee at its first meeting, which took place in Paris in July 1949, recommended the adoption by ISO of the series of preferred numbers defined by the table of ISA Bulletin 11, i.e. R 5, R 10, R 20, R 40. This meeting was attended by representatives of the 19 following nations: Austria, Belgium, Czechoslovakia, Denmark, Finland, France, Hungary, India, Israel, Italy, Netherlands, Norway, Poland, Portugal, Sweden, Switzerland, United Kingdom, U.S.A., U.S.S.R.

During the subsequent meetings in New York in 1952 and in The Hague in 1953, which were attended also by Germany, the series R 80 was added and slight alterations were made. The draft thus amended has become ISO Recommendation R 3.