
INTERNATIONAL STANDARD



1057

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Numerical control of machines — Interchangeable punched tape variable block format for positioning and straight-cut machining

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

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.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, International Standard ISO 1057 replaces ISO Recommendation R 1057-1969 drawn up by Technical Committee ISO/TC 97, *Computers and information processing*.

The Member Bodies of the following countries approved the Recommendation :

Australia	Iran	Spain
Belgium	Israel	Sweden
Czechoslovakia	Japan	Switzerland
Denmark	Netherlands	Turkey
Egypt, Arab Rep. of	New Zealand	United Kingdom
France	Poland	U.S.A.
Germany	Portugal	

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

Italy

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0 INTRODUCTION

The preparation of this International Standard has revealed the availability of a wide range of formats. Providing full interchangeability would lead, in many instances, to unwarranted and expensive equipment.

Accordingly, it was found better to draft two International Standards, namely :

- this International Standard, providing for interchangeability of input media for machines with compatible characteristics;

NOTE – The degree of interchangeability will depend upon the conformity of machines with respect to function, capacity, range, horsepower, geometric relationship of the axes and preparatory, miscellaneous and tooling functions.

- ISO 1058, which is consistent with this International Standard and which specifies the rules providing a minimum of uniformity in the manufacture of input media.

1 SCOPE AND FIELD OF APPLICATION

1.1 This International Standard applies to variable block format punched tapes, with tabulation and addresses, for positioning and straight-cut machining; it is intended to

- a) recommend application of the rules providing interchangeability of input media between machines of compatible characteristics;
- b) inform users of numerically controlled machines on the potentialities of control systems.

1.2 This International Standard is consistent with ISO 1058.

1.3 The format characteristics are specified in clause 4 and in annexes C and D.

1.4 The technical terms used in this International Standard are based on the ISO data processing vocabulary¹⁾.

1.5 Tape dimensions, character codes and nomenclature of axes conform respectively to ISO 1154 and ISO 1729, ISO 840 and ISO 1113, and ISO 841.

2 REFERENCES

ISO 840, *Numerical control of machines – 7-bit coded character set*.

ISO 841, *Numerical control of machines – Axis and motion nomenclature*.

ISO 1056, *Numerical control of machines – Punched tape block formats – Coding of preparatory functions G and miscellaneous functions M*.²⁾

ISO 1058, *Numerical control of machines – Punched tape variable block format for positioning and straight-cut machining*.

ISO 1113, *Information processing – Representation of 6- and 7-bit coded character sets on punched tape*.

ISO 1154, *Information processing – Punched paper tape – Dimensions and location of feed holes and code holes*.

ISO 1729, *Information processing – Unpunched paper tape – Specification*.

3 FORMAT MAKE-UP

3.1 Addresses

The address consists of a character which shall be in accordance with annex B.

3.2 Blocks

3.2.1 A block consists of the following :

1) In preparation.

2) At present at the stage of draft. (Revision of ISO/R 1056.)

3.2.1.1 The "sequence number" word.

3.2.1.2 The data words.

3.2.1.3 The "end of block" character, showing the end of each block, and which must, in addition, precede the first block of the program.

3.2.2 The data words are presented in the following sequence, and shall not be repeated within a block :

3.2.2.1 The "preparatory function" word.¹⁾

3.2.2.2 The "dimension" words.

These words shall be arranged in the following sequence :

X, Y, Z, U, V, W, P, Q, R, A, B, C, D, E.

3.2.2.3 The "feed function" word or words.

The "feed function" word applying only to a specific axis shall immediately follow the "dimension" word for that axis.

The "feed function" word applying to one or more of several axes shall follow the last "dimension" word to which it may apply.

3.2.2.4 The "spindle speed function" word.

3.2.2.5 The "tool function" word.

3.2.2.6 The "miscellaneous function" word.¹⁾

3.2.3 The words, the "tab" character excepted, may be omitted when not indispensable in a specific block of data. This should be understood as meaning that there is no change in the condition of the machine with respect to the function corresponding to the omitted word.

Instructions which are inherently executed in a single block must be repeated whenever necessary, for example a tool change.

3.2.4 The words appearing after the last one having an actual use within a block may be omitted, including the "tab" character, i.e. the "end of block" character may be used after any complete word.

3.3 Words

3.3.1 The length of each specific word and the position of the implicit decimal sign, as defined in the format specification, shall remain constant. Hence, to keep up the aforementioned length, the relevant number of zeros must be included.

3.3.2 The "tab" character is the first character in each word (except that the "sequence number" word has no "tab" character); the address character ("sequence number" excepted) is the second character and is followed by digital data.

3.3.3 The "dimension" words shall be either co-ordinate dimension words (absolute dimension) or incremental dimension words (relative dimension) according to format specification, and shall contain digital data as follows :

3.3.3.1 The most significant digit of the "dimension" word shall be first.

3.3.3.2 Units

3.3.3.2.1 All linear dimensions shall be expressed in millimetres or inches and decimal fractions thereof.

3.3.3.2.2 All angular dimensions shall be expressed in decimal parts of a revolution or in degrees and decimal parts of a degree; decimal parts of a revolution is recommended practice.

3.3.3.3 Decimal sign

Decimal sign shall not be used, its implicit position being defined by the format specification.

3.3.3.4 Sign of linear and angular dimensions

3.3.3.4.1 When the control system allows using absolute dimensions either positive or negative with respect to the origin of the co-ordinate system, the algebraic sign (+ or -) is part of the "dimension" word and shall precede the first digit.

3.3.3.4.2 When the control system only permits use of positive dimensions, the algebraic sign shall be omitted from the "dimension" words.

3.3.3.4.3 When the control system uses incremental dimensions, the algebraic sign (+ or -) is compulsory and shall precede the first digit of each dimension in order to show the direction of motion.

3.3.4 Non-dimension words shall contain digital data as follows :

3.3.4.1 The "sequence number" shall consist of three (3) digits.

3.3.4.2 The "preparatory function" shall be expressed by a two (2)-digit coded number. For designation, see the footnote on page 2.

1) For coding of preparatory and miscellaneous functions, see ISO 1056.