

INTERNATIONAL STANDARD

**ISO
4343**

Second edition
2000-10-15

Industrial automation systems — Numerical control of machines — NC processor output — Post processor commands

Systèmes d'automatisation industrielle — Commande numérique des machines — Informations de sortie des processeurs CN — Instructions post-processeur



Reference number
ISO 4343:2000(E)

© ISO 2000

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS

© ISO 2000

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

Contents

| | |
|--|------|
| Foreword | viii |
| Introduction | ix |
| 1 Scope | 1 |
| 2 Normative references | 1 |
| 3 Co-ordinate system | 1 |
| 3.1 Part program reference | 1 |
| 3.2 Machine program reference | 1 |
| 3.3 Units of measure | 2 |
| 4 General structure of post processor commands | 2 |
| 4.1 NC processor | 2 |
| 4.2 CLDATA | 2 |
| 4.3 Post processor | 3 |
| 5 General language | 6 |
| 5.1 General comments | 6 |
| 5.2 The ADAPTV command | 8 |
| 5.3 The AIR command | 9 |
| 5.4 The APPLY command | 10 |
| 5.5 The AUXFUN command | 11 |
| 5.6 The BREAK command | 12 |
| 5.7 The CALSUB command | 13 |
| 5.8 The CLAMP command | 14 |
| 5.9 The CLDATA command | 15 |
| 5.10 The COUPLE command | 16 |
| 5.11 The CUTCOM command | 17 |
| 5.12 The DEFSUB command | 18 |
| 5.13 The DELAY command | 19 |
| 5.14 The DISPLY command | 20 |
| 5.15 The END command | 21 |
| 5.16 The ENDSUB command | 22 |
| 5.17 The FEDRAT command | 23 |
| 5.18 The GOHOME command | 26 |

| | | |
|------|--------------------------|----|
| 5.19 | The GOPARK command | 27 |
| 5.20 | The HOMEPT command | 28 |
| 5.21 | The INCLUD command | 29 |
| 5.22 | The INSERT command | 30 |
| 5.23 | The LEADER command | 31 |
| 5.24 | The LIMIT command | 32 |
| 5.25 | The LOCATE command | 33 |
| 5.26 | The LPRINT command | 34 |
| 5.27 | The MACHIN command | 35 |
| 5.28 | The MATERIAL command | 36 |
| 5.29 | The MCHFIN command | 37 |
| 5.30 | The MCHTOL command | 38 |
| 5.31 | The MODE command | 39 |
| 5.32 | The MOVETO command | 43 |
| 5.33 | The OPSKIP command | 44 |
| 5.34 | The OPSTOP command | 45 |
| 5.35 | The ORIGIN command | 46 |
| 5.36 | The PARKPT command | 47 |
| 5.37 | The PARTNO command | 48 |
| 5.38 | The PPFUN command | 49 |
| 5.39 | The PPRINT command | 50 |
| 5.40 | The PPTIME command | 51 |
| 5.41 | The PREFUN command | 52 |
| 5.42 | The RAPID command | 53 |
| 5.43 | The RESET command | 54 |
| 5.44 | The REWIND command | 55 |
| 5.45 | The SAFPOS command | 56 |
| 5.46 | The SEQNO command | 57 |
| 5.47 | The STOP command | 58 |
| 5.48 | The SYNCTR command | 59 |
| 5.49 | The TLLIFE command | 61 |
| 5.50 | The TMARK command | 62 |
| 5.51 | The TRANS command | 63 |
| 6 | Die sinking EDM language | 64 |
| 6.1 | General comments | 64 |
| 6.2 | The APPLY command | 65 |
| 6.3 | The CUTCOM command | 66 |
| 6.4 | The FLUSH command | 69 |
| 6.5 | The GENRTR command | 72 |
| 6.6 | The LOAD command | 73 |
| 6.7 | The OP command | 74 |
| 6.8 | The SELECT command | 78 |
| 6.9 | The SPINDL command | 79 |
| 6.10 | The TOOLNO command | 83 |
| 6.11 | The UNLOAD command | 84 |

This document is a preview generated by EVS

| | | |
|-----------|--|------------|
| 7 | Flame cutting language | 85 |
| 7.1 | General comments | 85 |
| 7.2 | The APPLY command | 86 |
| 7.3 | The ASSIST command | 87 |
| 7.4 | The CLDIST command | 88 |
| 7.5 | The PIERCE command | 89 |
| 7.6 | The TORCH command | 90 |
| 8 | Grinding language | 91 |
| 8.1 | General comments | 91 |
| 8.2 | The APPLY command | 92 |
| 8.3 | The DRESS command | 93 |
| 9 | Laser-beam machining language | 94 |
| 9.1 | General comments | 94 |
| 9.2 | The APPLY command | 95 |
| 9.3 | The ASSIST command | 96 |
| 9.4 | The CLDIST command | 97 |
| 9.5 | The CYCLE command | 98 |
| 9.6 | The PIERCE command | 101 |
| 10 | Milling and drilling language | 102 |
| 10.1 | General comments | 102 |
| 10.2 | The APPLY command | 103 |
| 10.3 | The ARCSLP command | 104 |
| 10.4 | The CLAMP command | 105 |
| 10.5 | The CLEARP command | 106 |
| 10.6 | The COOLNT command | 107 |
| 10.7 | The CUTCOM command | 108 |
| 10.8 | The CYCLE command | 111 |
| 10.9 | The HEAD command | 133 |
| 10.10 | The INDPOS command | 134 |
| 10.11 | The LINTOL command | 135 |
| 10.12 | The LOAD command | 136 |
| 10.13 | The ORIGIN command | 137 |
| 10.14 | The RETRACT command | 140 |
| 10.15 | The ROTATE command | 141 |
| 10.16 | The SELECT command | 142 |
| 10.17 | The SPINDL command | 143 |
| 10.18 | The TOOLNO command | 147 |
| 10.19 | The UNLOAD command | 148 |
| 11 | Punching and forming language | 149 |
| 11.1 | General comments | 149 |
| 11.2 | The APPLY command | 150 |
| 11.3 | The CLAMP command | 151 |

| | | |
|-----------|--------------------------------|------------|
| 11.4 | The CYCLE command | 152 |
| 11.5 | The LOAD command | 163 |
| 11.6 | The PIERCE command | 164 |
| 11.7 | The SELECT command | 165 |
| 11.8 | The TOOLNO command | 166 |
| 11.9 | The UNLOAD command | 168 |
| 12 | Turning language | 169 |
| 12.1 | General comments | 169 |
| 12.2 | The APPLY command | 171 |
| 12.3 | The BARFED command | 172 |
| 12.4 | The CATCHR command | 173 |
| 12.5 | The CHUCK command | 174 |
| 12.6 | The CLAMP command | 176 |
| 12.7 | The COOLNT command | 179 |
| 12.8 | The COUPLE command | 180 |
| 12.9 | The CUTCOM command | 181 |
| 12.10 | The DEFCON command | 182 |
| 12.11 | The LOAD command | 183 |
| 12.12 | The MODE command | 184 |
| 12.13 | The OP command | 185 |
| 12.14 | The PITCH command | 195 |
| 12.15 | The SAFETY command | 196 |
| 12.16 | The SELECT command | 197 |
| 12.17 | The SPINDL command | 198 |
| 12.18 | The STAN command | 202 |
| 12.19 | The STDYRS command | 203 |
| 12.20 | The TLSTCK command | 204 |
| 12.21 | The TOOLNO command | 205 |
| 12.22 | The TURRET command | 206 |
| 12.23 | The UNLOAD command | 207 |
| 13 | Wire EDM language | 208 |
| 13.1 | General comments | 208 |
| 13.2 | The APPLY command | 209 |
| 13.3 | The CLDIST command | 210 |
| 13.4 | The CUTCOM command | 211 |
| 13.5 | The CYCLE command | 212 |
| 13.6 | The FLUSH command | 215 |
| 13.7 | The GENRTR command | 218 |
| 13.8 | The LOAD command | 219 |
| 13.9 | The ORIGIN command | 220 |
| 13.10 | The SELECT command | 221 |
| 13.11 | The STAN command | 222 |
| 13.12 | The TOOLNO command | 223 |
| 13.13 | The UNLOAD command | 224 |

This document is a preview generated by EVS

| | | |
|-----------|---|-----|
| 14 | Probing language | 225 |
| 14.1 | General comments | 225 |
| 14.2 | The APPLY command | 226 |
| 14.3 | The LOAD command | 227 |
| 14.4 | The MODE command | 228 |
| 14.5 | The PROBE command | 231 |
| 14.6 | The SELECT command | 237 |
| 14.7 | The TOOLNO command | 238 |
| 14.8 | The UNLOAD command | 239 |
| 14.9 | The VERIFY command | 240 |
| 15 | Drafting and plotting language | 250 |
| 15.1 | General comments | 250 |
| 15.2 | The DRAFT command | 251 |
| 15.3 | The LETTER command | 252 |
| 15.4 | The OVPLLOT command | 253 |
| 15.5 | The PENDWN command | 254 |
| 15.6 | The PENUP command | 255 |
| 15.7 | The PPLOT command | 256 |
| | Annex A (normative) Rules used in the syntax definitions | 258 |
| | Annex B (normative) List of keywords | 259 |

This document is a preview generated by EVS

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75% of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 4343 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 1, *Physical device control*.

This second edition cancels and replaces the first edition (ISO 4343:1978), which has been technically revised.

Annexes A and B form a normative part of this International Standard.

Introduction

The output of a general purpose numerical control processor is information used as input to a post processor. This information is called CLDATA, which was originally derived from “cutter location data.”

CLDATA provides a general language to pass manufacturing information from a numerical control processor to a post processor, where the general language is converted to the specific format required by the particular numerical control equipment. The logical and physical structure of CLDATA records are given in ISO 3592.

This International Standard defines a standard post processor vocabulary, in the context of command word and the parameters that can be associated with a command word. This vocabulary is encoded using the 2 000 class (“integer code type post processor command”) and 20 000 class (“literal type post processor command”) CLDATA records given in ISO 3592.

There is a one-to-one correspondence between the elements of the post processor vocabulary and the elements of the post processor command CLDATA records. The integer code numbers given in annex B of this International Standard are the code numbers that are used to represent keywords in the 2 000 class CLDATA records. The keyword names given in annex B of this International Standard are the names that are used to represent keywords in the 20 000 class CLDATA records.

Numerical control is applied to many types of machines, but the language defined in this International Standard has been developed primarily for numerically controlled machine tools – hence the words “tool” and “part” are used in the description of the language to indicate the working element and processed element respectively. Many of the vocabulary words are also derived from metal working terminology.

This document is a preview generated by EVS

Industrial automation systems — Numerical control of machines — NC processor output — Post processor commands

1 Scope

This International Standard defines the elements of a set of post processor statements to be used in numerical control software. These statements are encoded on 2 000 class and 20 000 class CLDATA records or their equivalent.

Each processor using one of the ISO numerical control programming languages shall be capable of producing post processor command type CLDATA records as defined in this International Standard.

Each post processor shall be capable of using the post processor command type CLDATA records defined in this international Standard as input.

This International Standard does not prescribe

- the mechanism by which the statements are processed;
- the medium on which the input language statements are recorded;
- the medium and format of output machine control data;
- the order of statements within a part program.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 841¹⁾, *Industrial automation systems – Numerical control of machines – Coordinate system and motion nomenclature*.

ISO 3592:2000, *Industrial automation systems – Numerical control of machines – NC processor output – File structure and language format*.

ISO 4342:1985, *Numerical control of machines – NC processor input – Basic part program reference language*.

ISO 6983-1:1982, *Numerical control of machines – Program format and definition of address words – Part 1: Data*

format for positioning, line motion and contouring control systems.

3 Co-ordinate system

3.1 Part program reference

ISO 841 is the basis for defining the co-ordinate system of CLDATA.

In the CLDATA, the reference axes of the co-ordinate system are *x*, *y* and *z*. Co-ordinates refer to a reference point on a tool (usually the center of the tip) relative to the part co-ordinate system. CLDATA can define the following location and orientation components:

| | |
|----------|--|
| <i>x</i> | Dimension parallel to X |
| <i>y</i> | Dimension parallel to Y |
| <i>z</i> | Dimension parallel to Z |
| <i>i</i> | X axis component of the tool axis vector |
| <i>j</i> | Y axis component of the tool axis vector |
| <i>k</i> | Z axis component of the tool axis vector |
| <i>i</i> | X axis component of a secondary orientation vector |
| <i>j</i> | Y axis component of a secondary orientation vector |
| <i>k</i> | Z axis component of a secondary orientation vector |

Unless otherwise specified, post processor command dimensional values refer to the CLDATA co-ordinate system. The following syntax is permitted as replacement for strings of numeric values representing CLDATA co-ordinates, CLDATA tool orientation vectors and CLDATA secondary orientation vectors.

```
XCOORD, x
YCOORD, y
ZCOORD, z
TLVEC, i, j, k
NORMAL, l, m, n
COORD, x, y, z [ , i, j, k [ [ , m, n ] ] ]
```

3.2 Machine program reference

ISO 841 is the basis for defining the standard configuration of machine axes.

On the machine, the reference axes of the co-ordinate system are *x*, *y* and *z*. Co-ordinates refer to a reference point on the machine (usually the center face of the tool holding mechanism) relative to the machine co-ordinate system. The origin and alignment of the CLDATA and machine reference systems coincide. Provision is made within this International Standard to define an alternate relationship

1) To be published. (Revision of ISO 841:1974)