ISO 13399 Brief Primer

ISO 13399 is intended to facilitate the use, manipulation and exchange of cutting tool data within and between manufacturing, distribution, and usage. ISO 13399 specifies the data representation of everything between the workpiece and the machine tool. An ISO 13399 exchange file contains an electronic representation of cutting tool data as defined by the information structure that can be exchanged by tooling applications.

ISO 13399 defines the information structure needed to describe various data about cutting tools and cutting tool assemblies. ISO 13399, Cutting Tool data representation and exchange is organized according to the division of cutting tools into the sections shown in Figure 1. The ISO 13399 family broadly follows this arrangement of components.



Figure Cutting Tool Abstraction

* A cutting tool refers to an assembly of items for removing material from a workpiece through a shearing action at the defined cutting edge or edges of the device.
* A cutting item refers to the part of the tool used to remove material from the work piece through a shearing action at defined cutting edges.
* A tool item provides the mechanical structure that holds the cutting item in place so that it can act on the work piece.
* An adaptive item attaches a tool item to the machine tool. The entire system is an assembly of parts that together constitute a modern cutting tool.
* An assembly is a collection of one or more adaptive items, a tool item and cutting items.

The standard defines the terms and properties used to describe them. It is divided into the following parts:

* Part 1: Overview, fundamental principles and general information model – provides the information model that describes tool assembly and specifies the structure and forma t in which product data for the tool is exchanged;
* Part 2: Reference dictionary for the cutting items – gives terms and definitions of product data for cutting items;
* Part 3: Reference dictionary for tool items – gives terms and definitions of product data for tool items;
* Part 4: Reference dictionary for adaptive items – gives terms and definitions of product data for adaptive items;
* Part 5: Reference e dictionary for assembly items – gives terms and definitions for the devices that hold the cutting items on the tool item;
* Part 50: Reference dictionary for reference systems and common concepts – defines a common coordinate reference system for all the components of a cutting tool and for the assembly;
* Part 60: Reference dictionary for connection systems – defines the shape of the mechanical interfaces provided by adaptive items;
* Part 100: Definitions, principles and methods for reference dictionaries – describes how ISO 13584 was used to create reference dictionaries and gives guidance on how the dictionaries can be maintained and updated;
* Part 150: Usage guideline – offers guidance on the implementation of the information model in software applications.

ISO 13399 is defined as a Schema in the ISO 130303 Express language. The ISO 13399 schema develops a framework in which to define tooling properties, tooling assemblies, and relationship between tooling elements. There are no actual tooling properties in the ISO 13399 schema. Instead ISO 13399 develops a programming structure in which to embed ISO 13584, which is the Industrial automation systems and integration – Parts library (PLIB). ISO 13399 leverages the ISO 13584 tooling parts library in defining properties. ISO 13584 defines tooling reference dictionaries that ISO 13399 then refers to within the definitions of tooling and their properties. For example, ISO 13584-511 is a reference dictionary for threaded items defined in current ISO standards. ISO 13399-5 refers to ISO 13584-511 for definitions of threaded items conforming to these standards.

The tables in the appendices contain the PLIB identification codes for each ISO 13399 Part reference dictionary.

# Representing Tools in ISO 13399 – Part 28

Cutting tool data are characteristics of the cutting tool and its use that must be known and evaluated in order to make manufacturing decisions and to perform manufacturing operations. Information about inserts, solid tools (e.g. solid drill and solid endmill), assembled tools (e.g. boring bars, indexable drills and indexable milling cutters), adaptors (e.g. milling arbor and chucks), components (e.g. shims, screws and clamps) or any combination of the above can be exchanged. The cutting tool data described include, but are not limited to, geometrical and dimensional data, identification and designation data, miscellaneous and spare part data, cutting material data, and component connectivity.

ISO 10303 Part 28 is the “Industrial automation systems and integration—Product data representation and exchange—Part 28: Implementation methods: XML representations of EXPRESS schema and data” standard. ISO 10303 Part 28 specifies the use of the Extensible Markup Language (XML) to represent EXPRESS schema (ISO 10303 Part 11) and the data that is represented by those EXPRESS schemas. It is an XML alternative method to STEP Part 21 file for the exchange of data according to ISO 10303 Express schemas.

**It has two binding styles, of which I have no idea where they fit in. I’m assuming we are doing early bound xml, as its already confusing enough.**

* Late Bound XML markup declaration set, independent of all EXPRESS schemas, to describe the XML representation of the data governed by each schema
* Early Bound XML markup declaration sets, for each of the schemas, to describe the XML representation of the data governed by that specific schema

## Working with properties

We will look at the coolant entry style code property. coolant entry style code has a PLIB class id and property id:

|  |  |  |
| --- | --- | --- |
|  | Property ID | Class ID |
| coolant entry style code | 71CF2985DCED3 |  |
| coolant supply | 71CE7A72B6DA7 | 71DF8C3C065EB |

Does 71CE7A72B6DA7 refer to the property class coolant supply?

The coolant entry style code is then represented in ISO 13399 by a series of Express definition. Below is a sample property value information model structure:



Figure Sample Property Value Information Model Structure

A property\_value\_representation is used to define properties, based on a property and a value. Each property has a PLIB class and property reference, with values being refined by further refinement for units, representation type (e.g., string verus double) , language of representation (e.g., English versus Swedish), potential textual description, version control, etc.

|  |  |
| --- | --- |
| Express item | Description |
| Plib\_class\_reference | A plib\_class\_reference designates a class in a library compliant to ISO 13584 (Parts Library). |
| Plib\_property\_reference | A plib\_property\_reference designates a property in a library compliant to ISO 13584 |
| Property | A property is the definition of a particular quality. A property may reflect physics or arbitrary user defined measurements |
| Property\_value\_representation | A property\_value\_representation is the representation of property |
| String\_value | The specified\_value specifies the property\_value that qualifies the property\_value\_representation by a value\_with\_unit, a string\_value, or an arbitrary aggregate thereof A string\_value represents a sequence of one or more alphanumeric characters. A string\_value is a type of property\_value |
| Multi\_language\_string | A multi\_language\_string represents text information, expressed in one or more languages, that is associated  with objects. |
| String\_with\_language | A string\_with\_language represents text information in a specific language together with an identification of the  language used. |
| Language | A language is a specification of the language in which information is given. An embedded language\_code specifies the language of the text information in the Alpha-3 code specified in ISO 639-2 |

Below is the series of XML required to specify the coolant entry style code. In the XML below, the id ,e.g, id="id-75" represents the definition of an Express element. The ref attriubtue, e.g., ref="id-75" acts as a pointer to another Express element. Note “iso13399:” acts as a namespace (ns) qualifier to prevent duplicate name and to distinguish the element from other XML namespaces. Not sure why <Code>, <Supplier\_bsu> and others do not have a namespace qualifier as well. Below, /IGNORE means that the parameter does not have a value and can be ignored.

------------------------------------------------------------------

<iso13399:Plib\_class\_reference id="id-75">

<Code>71DF8C3C065EB</Code>

<Supplier\_bsu>0112/1///13399</Supplier\_bsu>

<Version>001</Version>

</iso13399:Plib\_class\_reference>

------------------------------------------------------------------

<iso13399:Plib\_property\_reference id="id-74">

<Code>71CF2985DCED3</Code>

<Name\_scope>

<iso13399:plib\_class\_reference xsi:nil="true" ref="id-75"/>

</Name\_scope>

<Version>001</Version>

</iso13399:Plib\_property\_reference>

------------------------------------------------------------------

<iso13399:Property id="id-235">

<Allowed\_unit></Allowed\_unit>

<Id>/IGNORE</Id>

<Property\_source>

<iso13399:plib\_property\_reference xsi:nil="true" ref="id-74"/>

</Property\_source>

<Property\_type>/IGNORE</Property\_type>

<Version\_id>/IGNORE</Version\_id>

</iso13399:Property>

------------------------------------------------------------------

<iso13399:Property\_value\_representation id="id-328">

<Definition>

<iso13399:property xsi:nil="true" ref="id-235"/>

</Definition>

<Specified\_value>

<iso13399:string\_value xsi:nil="true" ref="id-3"/>

</Specified\_value>

</iso13399:Property\_value\_representation>

------------------------------------------------------------------

<iso13399:String\_value id="id-3">

<Value\_name>coolant entry style code</Value\_name>

<Value\_specification>

<iso13399:multi\_language\_string xsi:nil="true" ref="id-4"/>

</Value\_specification>

</iso13399:String\_value>

------------------------------------------------------------------

<iso13399:Multi\_language\_string id="id-4">

<Additional\_language\_string></Additional\_language\_string>

<Primary\_language\_string>

<iso13399:string\_with\_language xsi:nil="true" ref="id-657"/>

</Primary\_language\_string>

</iso13399:Multi\_language\_string>

------------------------------------------------------------------

<iso13399:String\_with\_language id="id-657">

<Contents>0</Contents>

<Language\_specification>

<iso13399:language xsi:nil="true" ref="id-647"/>

</Language\_specification>

</iso13399:String\_with\_language>

------------------------------------------------------------------

<iso13399:Language id="id-647">

<Language\_code>eng</Language\_code>

</iso13399:Language>

# References

1. Jonas Nordström and Norman Swindells, “A new era for cutting tools”, ISO Focus December 2007.
2. ISO, “ISO 13399-1:2006 Cutting tool data representation and exchange -- Part 1: Overview, fundamental principles and general information model”, 2006.

# Appendix I PLIB Property/Id Code Tables

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table Part 2 Reference dictionary for the cutting items Properties   |  |  | | --- | --- | | Property name | Identification code (BSU) | | chip breaker face count | 71CE7A85CC4F9 | | chip breaker manufacturers designation | 71CE7A86A4264 | | chip breaker property | 71CED0217FA18 | | chip breaker width | 71CE7A870948A | | clearance angle major | 71DD70308D3E3 | | clearance angle minor | 71DD7030E0A00 | | clearance angle wiper edge | 71DD7031A98E9 | | coating property | 71DD703B84298 | | corner chamfer angle | 71DD6C88F9210 | | corner chamfer length | 71DD6C895C25B | | corner chamfer width | 71DD6C89A120F | | corner count | 71CEAE9B67E4C | | corner identity | 71DD6C8802580 | | corner radius | 71DD6C8ACA503 | | cutting depth maximum | 71CEAEBD5A66A | | cutting edge angle major | 71CE7AA02C1CC | | cutting edge angle major left hand | 71CE7AA3440B4 | | cutting edge angle major right hand | 71CE7AA78C2F0 | | cutting edge condition code | 71DD6C90953D8 | | cutting edge count | 71CEAE9B489F4 | | cutting edge curvature | 71DD6C950E7CC | | cutting edge effective length | 71DD6C958C615 | | cutting edge identity | 71DD6C8B86265 | | cutting edge length | 71DD6C95DA49B | | cutting point translation X-direction | 71FD1E2EDD973 | | cutting point translation Y-direction | 71FD1E2F66B38 | | cutting width | 71CEAEBE2B825 | | depth of cut maximum | 71D07576C0558 | | face land angle | 71DD6C9332D2C | | face land size code | 71DD6C9371B86 | | face land width | 71DD6C9394F40 | | fixing hole diameter | 71CE7A968C8FE | | fixing hole property | 71D1C829BC044 | | flank identity | 71DD70158265C | | hand | 71CF29872F0AB | | inscribed circle diameter | 71CE7A96D9F7D | | inscribed circle property | 71D1C82A5036D | | insert body width | 71CE7A9751A90 | | insert cutting diameter | 71CF30F02C968 | | insert diameter | 71D20799C721A | | insert included angle | 71CE7A96BC122 | | insert index count | 71CE7AA1998FF | | insert interface code | 71CE7A9936610 | | insert length | 71CE7A9DFA23A | | insert mounting style code | 71CE7A97711B8 | | insert rake angle | 71CE7A9EDACA1 | | insert shape code | 71CE7A9F0C79F | | insert thickness | 71CE7A9F5308C | | insert width | 71CE7A9FB11C3 | | interupted edge property | 71DD701175021 | | m-dimension | 71CE7AA0972DB | | m2-dimension | 71CE7AA05C819 | | profile angle left hand | 71CEAEBEAB020 | | profile angle right hand | 71CEAEBED837E | | profile distance ex | 71CEAEBFEF1B4 | | profile distance ey | 71CEAEC0139BB | | profile included angle | 71CEAEBF0C234 | | profile style code | 71CEAEBDE5798 | | relief angle | 71DD9D00193A7 | | relief angle left hand | 71CE7E6520B87 | | relief angle right hand | 71CE7E6569AB5 | | rounded corner property | 71DD7011A3D86 | | taper gradient | 71CEAEC02FEBD | | taper thread count | 71DF154901E44 | | thread form type | 71D1A69F60053 | | thread hand | 71E033FCBB61C | | thread height actual | 71DF5BE65F86F | | thread height difference | 71DF5BE617131 | | thread height theoretical | 71DF5BE5BCEBE | | thread pitch | 71CEAEC08D4B0 | | thread pitch maximum | 71D1A6A283836 | | thread pitch minimum | 71D1A6A247E1F | | thread profile type | 71CEAEC114603 | | thread tolerance class | 71DF153FA5F85 | | thread type | 71D1A6A16E6ED | | threads per inch | 71D1A6AAC8707 | | threads per inch maximum | 71D1A6AB8F739 | | threads per inch minimum | 71D1A6AB6FB19 | | tipped cutting edge code | 71CE7AA1E3D75 | | tolerance class insert | 71CE7AA215888 | | tooth count | 71CEAEBF8A68E | | wiper edge length | 71CE7AA249F88 | | wiper edge property | 71CED022114EC | |
|  |
|  |

Table Part 3 Reference dictionary for tool items

|  |  |
| --- | --- |
| Property name | Identification code (BSU) |
| a dimension on lf | 71D0793ECEF9A |
| a dimension on wf | 71CF299431CAC |
| adjustability | 71EBBA9E78025 |
| balance quality code | 71DF151EA5CF1 |
| balanced by design | 71EAC0CAB861F |
| body clearance depth | 71EAC81F88336 |
| body diameter | 71ED6A9AF7D1D |
| body half taper angle | 71EAC472BD116 |
| body height | 71EBB332C60EB |
| body length | 71ED6AA478A3D |
| body length maximum | 71DCD3B16750B |
| body material code | 71DF1523224D8 |
| body width | 71EBB33230236 |
| burr type code | 71DF1523869EE |
| cartridge size code | 71DF1523EE184 |
| clamping length | 71EBAF896BE9A |
| clamping type code | 71CF298EEB4F5 |
| clamping width | 71EBAF85006BD |
| clearance angle axial | 71EAC83CD450B |
| clearance angle normal | 71ED6E5CD0DAE |
| clearance angle radial | 71EAC83B73825 |
| coating property | 71DD703B84298 |
| connection bore depth | 71EAC48CAD407 |
| connection diameter | 71EBDBF5060E6 |
| connection size code | 71FC193318002 |
| connection unit basis | 71ED6E16D5978 |
| coolant supply property | 71EBB342CC751 |
| cutting diameter | 71D084653E57F |
| cutting end count | 71DCD00CBBC2A |
| cutting item count | 71DF8C52B8926 |
| cutting pitch density | 71DF15283219C |
| cutting width | 71CEAEBE2B825 |
| cutting width maximum | 71D07569F8BC3 |
| cutting width minimum | 71D0756A28B42 |
| damping property | 71CED03D70452 |
| data chip provision | 71CF29869CA0F |
| depth of cut maximum | 71D07576C0558 |
| drill back taper | 71EAC81AD9AE1 |
| drive angle | 71D08096F930C |
| drive count | 71E0306423B2A |
| drop head design | 71EAC49F75413 |
| flute count | 71DCCFEBB883E |
| flute design code | 71DCCFEC645BD |
| flute helix angle | 71DCCFEC20115 |
| flute helix hand | 71DCCFF654756 |
| flute helix pitch | 71DCCFF6A1A13 |
| fluted land width | 71EAC8210DF36 |
| functional height | 71CF29994E737 |
| functional length | 71DCD39338974 |
| functional width | 71CF29984CDA7 |
| functional width 2 | 71D193F495583 |
| guide element property | 71EE070696F08 |
| guide pilot diameter | 71ED6A7A6E6A2 |
| hand | 71CF29872F0AB |
| head back offset length | 71D075730A82B |
| head back offset width | 71D075731F172 |
| head diameter | 71E03062EC034 |
| head length | 71D07574A61E8 |
| hub diameter | 71D087D3B17B0 |
| hub property | 71DF5C078FF46 |
| hub thickness | 71D087D3F5E07 |
| inclination angle | 71D075754F8A3 |
| insert adjustable count | 71DF1538E7378 |
| insert interface code | 71CE7A9936610 |
| insert seat size code | 71CEAEBF2A69F |
| interlocking capabilty | 71DF1526AC952 |
| keyway property | 71DF5C0761888 |
| length chip flute | 71DCCC27DEF53 |
| minimum bore diameter | 71D07543367C5 |
| mounting hole angle | 71EAC0F064E2D |
| mounting hole distance | 71EAC0E9FA4CD |
| mounting hole height | 71EAC0EFA1BF3 |
| neck diameter | 71EAC48EC5DE0 |
| neck length | 71EBC1E026769 |
| overall height | 71D078EB73E87 |
| overall length | 71D078EB7C086 |
| overall length minimum | 71EBC1E8857BE |
| overall width | 71CF299257986 |
| pilot drill protrusion | 71EAC49030828 |
| pilot protruding length | 71DCCFD24119E |
| plug chamfer diameter | 71EBC1EA293DC |
| plug style | 71E02C679DC6D |
| plunge depth maximum | 71D08099F1DDC |
| point angle | 71DCCC4FEF366 |
| point length | 71DCCFD064042 |
| profile specification | 71DF8C5D91804 |
| protruding length | 71DCD394BB20E |
| qualified tool code | 71D078ED2C21E |
| rake angle axial | 71CF29990C41F |
| rake angle normal | 71CF2998EBD46 |
| rake angle orthogonal | 71D0808F8F719 |
| rake angle radial | 71CF2998A1609 |
| row identifier | 71CED04867743 |
| shank diameter | 71CF29862B277 |
| shank height | 71CF29883E014 |
| shank length | 71CF298870946 |
| shank width | 71CF298751FCF |
| shim inclination angle | 71FAE074D2EBD |
| step count | 71DCCC3BD1B96 |
| step diameter length | 71DCCC3DFA23A |
| step distance | 71DCCC47221E0 |
| step included angle | 71DF151D6E547 |
| stock removal maximum | 71EBC1EC0BB22 |
| stock removal minimum | 71EBC1EBC839F |
| tap type identifier | 71DF153B4ABCD |
| taper angle | 71EAC4A2B6544 |
| taper gradient | 71CEAEC02FEBD |
| tapered | 71EC659C9B3CE |
| thread diameter | 71E02C5C2EED3 |
| thread diameter size | 71EBBAA3BCA70 |
| thread tolerance class | 71DF153FA5F85 |
| tool cutting edge angle | 71D078F683C9B |
| tool holder shape code | 71D078FD4E7BE |
| tool lead angle | 71D078F77616B |
| tool style code | 71D078FBF6C68 |
| unit system | 71EBBA9ED6C0A |
| usable length | 71EBB33490FDA |
| usable length maximum | 71CF2992BDBCC |
| web taper | 71EAC823D95A7 |
| web thickness | 71EAC82313165 |
| weight of item | 71CED03C97AAB |

Table Part 4 Reference dictionary for adaptive items

|  |  |
| --- | --- |
| Property name code (BSU) | Identification code (BSU) |
| adaptor clamp | 71CED04F3300A |
| adaptor tool clamp | 71CED04F920EC |
| adjusting screw protrusion | 71EAC0F0EFDB6 |
| balance quality code | 71DF151EA5CF1 |
| balanced by design | 71EAC0CAB861F |
| body diameter | 71ED6A9AF7D1D |
| body diameter maximum | 71D08462F8185 |
| body half taper angle | 71EAC472BD116 |
| body height | 71EBB332C60EB |
| body length | 71ED6AA478A3D |
| body length maximum | 71DCD3B16750B |
| body material code | 71DF1523224D8 |
| body taper end length | 71EADEA2BF8DF |
| body width | 71EBB33230236 |
| cartridge size code | 71DF1523EE184 |
| clamping force maximum | 71CED05149532 |
| clamping length | 71EBAF896BE9A |
| clamping length maximum | 71ED6E54B15C4 |
| clamping length minimum | 71EBB339ED2BD |
| clamping width | 71EBAF85006BD |
| connection bore depth | 71EAC48CAD407 |
| connection bore diameter | 71E01D92C41E8 |
| connection bore diameter maximum | 71EBDBF4D0F49 |
| connection bore diameter minimum | 71EBDBF49F96C |
| connection code machine side | 71D102AE3B252 |
| connection code workpiece side | 71D102AE8A5A9 |
| connection count workpiece side | 71EDD2C17746F |
| connection diameter | 71EBDBF5060E6 |
| connection retention knob thread size | 71CF298A76B66 |
| connection size code | 71FC193318002 |
| connection unit basis | 71ED6E16D5978 |
| contact surface diameter machine side | 71D087D97FCE3 |
| contact surface diameter workpiece side | 71EAC0DD5D650 |
| coolant supply property | 71EBB342CC751 |
| damping property | 71CED03D70452 |
| data chip provision | 71CF29869CA0F |
| driving key type | 71EC5E1ECC776 |
| functional height | 71CF29994E737 |
| functional length | 71DCD39338974 |
| functional length minimum | 71EBC1EB8456A |
| functional width | 71CF29984CDA7 |
| kappa | 71ED6E4A7EFBA |
| keyway property | 71DF5C0761888 |
| overall height | 71D078EB73E87 |
| overall length | 71D078EB7C086 |
| overall width | 71CF299257986 |
| phi | 71ED6E4AE850B |
| protruding length | 71DCD394BB20E |
| rho | 71ED6E4B254E5 |
| rotational speed maximum | 71DF153A691F2 |
| shank diameter | 71CF29862B277 |
| shank height | 71CF29883E014 |
| shank length | 71CF298870946 |
| shank width | 71CF298751FCF |
| side | 71EBDBF130AE6 |
| tool changer interference diameter maximum | 71CF298A3A99A |
| tool changer interference length minimum | 71CF2989AF0E0 |
| tool style code | 71D078FBF6C68 |
| unit system | 71EBBA9ED6C0A |
| usable length | 71EBB33490FDA |
| usable length maximum | 71CF2992BDBCC |
| weight of item | 71CED03C97AAB |

Table Part 5 Reference dictionary for assembly items

|  |  |
| --- | --- |
| Property name code (BSU) | Identification code (BSU) |
| adaptor clamp | 71CED04F3300A |
| adaptor tool clamp | 71CED04F920EC |
| adjusting screw protrusion | 71EAC0F0EFDB6 |
| balance quality code | 71DF151EA5CF1 |
| balanced by design | 71EAC0CAB861F |
| body diameter | 71ED6A9AF7D1D |
| body diameter maximum | 71D08462F8185 |
| body half taper angle | 71EAC472BD116 |
| body height | 71EBB332C60EB |
| body length | 71ED6AA478A3D |
| body length maximum | 71DCD3B16750B |
| body material code | 71DF1523224D8 |
| body taper end length | 71EADEA2BF8DF |
| body width | 71EBB33230236 |
| cartridge size code | 71DF1523EE184 |
| clamping force maximum | 71CED05149532 |
| clamping length | 71EBAF896BE9A |
| clamping length maximum | 71ED6E54B15C4 |
| clamping length minimum | 71EBB339ED2BD |
| clamping width | 71EBAF85006BD |
| connection bore depth | 71EAC48CAD407 |
| connection bore diameter | 71E01D92C41E8 |
| connection bore diameter maximum | 71EBDBF4D0F49 |
| connection bore diameter minimum | 71EBDBF49F96C |
| connection code machine side | 71D102AE3B252 |
| connection code workpiece side | 71D102AE8A5A9 |
| connection count workpiece side | 71EDD2C17746F |
| connection diameter | 71EBDBF5060E6 |
| connection retention knob thread size | 71CF298A76B66 |
| connection size code | 71FC193318002 |
| connection unit basis | 71ED6E16D5978 |
| contact surface diameter machine side | 71D087D97FCE3 |
| contact surface diameter workpiece side | 71EAC0DD5D650 |
| coolant supply property | 71EBB342CC751 |
| damping property | 71CED03D70452 |
| data chip provision | 71CF29869CA0F |
| driving key type | 71EC5E1ECC776 |
| functional height | 71CF29994E737 |
| functional length | 71DCD39338974 |
| functional length minimum | 71EBC1EB8456A |
| functional width | 71CF29984CDA7 |
| kappa | 71ED6E4A7EFBA |
| keyway property | 71DF5C0761888 |
| overall height | 71D078EB73E87 |
| overall length | 71D078EB7C086 |
| overall width | 71CF299257986 |
| phi | 71ED6E4AE850B |
| protruding length | 71DCD394BB20E |
| rho | 71ED6E4B254E5 |
| rotational speed maximum | 71DF153A691F2 |
| shank diameter | 71CF29862B277 |
| shank height | 71CF29883E014 |
| shank length | 71CF298870946 |
| shank width | 71CF298751FCF |
| side | 71EBDBF130AE6 |
| tool changer interference diameter maximum | 71CF298A3A99A |
| tool changer interference length minimum | 71CF2989AF0E0 |
| tool style code | 71D078FBF6C68 |
| unit system | 71EBBA9ED6C0A |
| usable length | 71EBB33490FDA |
| usable length maximum | 71CF2992BDBCC |
| weight of item | 71CED03C97AAB |

Table Part 50 Reference dictionary for reference systems and common concepts

|  |  |
| --- | --- |
| Property name code (BSU) | Identification code (BSU) |
| actuation force | 71EBBA9B56D06 |
| actuation method | 71EBBA9BCB5F2 |
| adaptor clamp | 71CED04F3300A |
| adaptor tool clamp | 71CED04F920EC |
| adjusting screw protrusion | 71EAC0F0EFDB6 |
| balance quality code | 71DF151EA5CF1 |
| balanced by design | 71EAC0CAB861F |
| body clearance depth | 71EAC81F88336 |
| body diameter | 71ED6A9AF7D1D |
| body diameter maximum | 71D08462F8185 |
| body half taper angle | 71EAC472BD116 |
| body height | 71EBB332C60EB |
| body length | 71ED6AA478A3D |
| body length maximum | 71DCD3B16750B |
| body material code | 71DF1523224D8 |
| body taper end length | 71EADEA2BF8DF |
| body width | 71EBB33230236 |
| bolt hole circle count | 71ED6E58E5A62 |
| cartridge size code | 71DF1523EE184 |
| chisel edge angle | 71EAC82B2A50E |
| chisel edge length | 71EAC82ADE5EA |
| clamping force maximum | 71CED05149532 |
| clamping length | 71EBAF896BE9A |
| clamping length maximum | 71ED6E54B15C4 |
| clamping length minimum | 71EBB339ED2BD |
| clamping width | 71EBAF85006BD |
| clearance angle axial | 71EAC83CD450B |
| clearance angle radial | 71EAC83B73825 |
| connection bore depth | 71EAC48CAD407 |
| connection bore diameter | 71E01D92C41E8 |
| connection bore diameter maximum | 71EBDBF4D0F49 |
| connection bore diameter minimum | 71EBDBF49F96C |
| connection code machine side | 71D102AE3B252 |
| connection code workpiece side | 71D102AE8A5A9 |
| connection count workpiece side | 71EDD2C17746F |
| connection diameter | 71EBDBF5060E6 |
| connection retention knob thread size | 71CF298A76B66 |
| connection size code | 71FC193318002 |
| connection unit basis | 71ED6E16D5978 |
| contact surface diameter machine side | 71D087D97FCE3 |
| contact surface diameter workpiece side | 71EAC0DD5D650 |
| coolant entry centre line distance | 71EBDBF22CF58 |
| coolant entry diameter | 71CF2985AA87C |
| coolant entry inclination angle | 71EBDBF2CEE6A |
| coolant entry rotation angle | 71EBDBF289BB9 |
| coolant entry style code | 71CF2985DCED3 |
| coolant entry thread size | 71D07558CEF8A |
| coolant exit diameter | 71CF298AA8D1F |
| coolant exit style code | 71CF2985FC5FC |
| coolant exit thread size | 71D075633189D |
| coolant pressure | 71EAC478A4164 |
| coolant radial entry thread size | 71CF298963036 |
| coolant ring seat width | 71CF298EB6D72 |
| coolant supply property | 71EBB342CC751 |
| cutting point translation X-direction | 71FD1E2EDD973 |
| cutting point translation Y-direction | 71FD1E2F66B38 |
| damping property | 71CED03D70452 |
| data chip provision | 71CF29869CA0F |
| diameter access hole | 71EBB2F865924 |
| diameter bolt circle | 71EAC0DECE78F |
| drill back taper | 71EAC81AD9AE1 |
| driving key type | 71EC5E1ECC776 |
| flange diameter | 71EC61D8A1771 |
| flange diameter internal | 71EC61D7F2071 |
| flange height | 71EEF5384E141 |
| flange location | 71F90EA1ED67E |
| flange thickness | 71EEF53809764 |
| flange width | 71EEF5387E914 |
| fluted land width | 71EAC8210DF36 |
| functional height | 71CF29994E737 |
| functional length | 71DCD39338974 |
| functional length minimum | 71EBC1EB8456A |
| functional width | 71CF29984CDA7 |
| hand | 71CF29872F0AB |
| inscribed circle property | 71D1C82A5036D |
| insert included angle | 71CE7A96BC122 |
| insert interface code | 71CE7A9936610 |
| insert length | 71CE7A9DFA23A |
| insert seat size code | 71CEAEBF2A69F |
| insert shape code | 71CE7A9F0C79F |
| insert thickness | 71CE7A9F5308C |
| insert width | 71CE7A9FB11C3 |
| kappa | 71ED6E4A7EFBA |
| keyway property | 71DF5C0761888 |
| keyway width | 71D0841ADC9E0 |
| margin width | 71EAC828C8308 |
| overall height | 71D078EB73E87 |
| overall length | 71D078EB7C086 |
| overall length minimum | 71EBC1E8857BE |
| overall width | 71CF299257986 |
| phi | 71ED6E4AE850B |
| protruding length | 71DCD394BB20E |
| rho | 71ED6E4B254E5 |
| rotational speed maximum | 71DF153A691F2 |
| rounded corner property | 71DD7011A3D86 |
| runout axial | 71ED6A70807F7 |
| runout axial adjustment | 71D0845C77193 |
| runout radial | 71DF8C660035E |
| runout radial adjustment | 71D0846298D19 |
| shank diameter | 71CF29862B277 |
| shank height | 71CF29883E014 |
| shank length | 71CF298870946 |
| shank width | 71CF298751FCF |
| side | 71EBDBF130AE6 |
| thread diameter | 71E02C5C2EED3 |
| thread hand | 71E033FCBB61C |
| thread length | 71FC209CD4A91 |
| thread pitch | 71CEAEC08D4B0 |
| thread starts | 71FC06ABEA7D3 |
| thread tolerance class | 71DF153FA5F85 |
| threads per inch | 71D1A6AAC8707 |
| tool changer interference diameter maximum | 71CF298A3A99A |
| tool changer interference length minimum | 71CF2989AF0E0 |
| tool style code | 71D078FBF6C68 |
| torque | 71DF153B14F02 |
| unit system | 71EBBA9ED6C0A |
| usable length | 71EBB33490FDA |
| usable length maximum | 71CF2992BDBCC |
| web taper | 71EAC823D95A7 |
| web thickness | 71EAC82313165 |
| weight of item | 71CED03C97AAB |
| wiper edge property | 71CED022114EC |
| xyw plane distance | 71ED6E4F42626 |
| xzw plane distance | 71ED6E4F7A8CF |
| yzw plane distance | 71ED6E4FA83F6 |

Table Part 60 Reference dictionary for connection systems

|  |  |
| --- | --- |
| Property name code (BSU) | Identification code (BSU) |
| clamping length | 71EBAF896BE9A |
| clamping length maximum | 71ED6E54B15C4 |
| clamping length minimum | 71EBB339ED2BD |
| connection bore depth | 71EAC48CAD407 |
| connection code machine side | 71D102AE3B252 |
| connection code workpiece side | 71D102AE8A5A9 |
| connection size code | 71FC193318002 |
| connection unit basis | 71ED6E16D5978 |
| coolant supply property | 71EBB342CC751 |
| form type | 71EBBE32903BD |
| side | 71EBDBF130AE6 |

# Appendix I Cutting Tool Representation



Figure ISO 13399 Cutting Tool Parameters



Figure Sample ISO 13399 Cutting Tool Parameters