INTERNATIONAL STANDARD

ISO 8999

Second edition
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Reciprocating internal combustion engines — Graphical symbols

Moteurs alternatifs à combustion interne — Symboles graphiques

Reference number
ISO 8999:2001(E)

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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 8999 was prepared by Technical Committee ISO/TC 70, *Internal combustion engines*.

This second edition cancels and replaces the first edition (ISO 8999:1993), which has been technically revised.

Reciprocating internal combustion engines — Graphical symbols

1 Scope

This International Standard specifies graphical symbols for operator controls, gauges, tell-tale indicators and instructions for reciprocating internal combustion (RIC) engines in order to provide necessary information on their use and operation.

It is applicable to RIC engines for land, rail traction and marine use, excluding engines used to propel road vehicles and aircraft.

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 3461-1:1988, *General principles for the creation of graphical symbols — Part 1: Graphical symbols for use on equipment.*

ISO 3864:1984, *Safety colours and safety signs.*

IEC 60073:1996, *Basic and safety principles for man-machine interface, marking and identification — Coding principles for indication devices and actuators.*

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

3.1
basic graphical symbol
symbol used individually or in combination to make a composite symbol

3.2
composite symbol
symbol made from combinations of symbol elements

4 Use of symbols

4.1 Symbols shall be as shown in clauses 5 to 7 of this International Standard. In general, symbols are shown in outline form. Where necessary, for legibility when reduced to a small size, enclosed areas within symbols or symbol elements may be filled in.

4.2 The symbols included in clause 5 are basic symbols which may be used for general application as well as to create composite symbols.

4.3 The composite symbols included in clauses 6 and 7 are developed using basic symbols from clause 5 as elements where applicable to provide families of symbols associated with functions and systems.

4.4 As required, additional composite symbols may be developed using the basic symbols from clause 5, provided that the characteristics specified in ISO 3461-1 be maintained.

4.5 Limitations inherent in some reproduction and display technologies may require increased line thickness or other minor modifications of symbols. Such modifications are acceptable provided the symbol remain unchanged in its basic graphical elements and remain easily discernible by the operator.

4.6 Additionally, to improve the appearance and perceptibility of a graphical symbol or to coordinate with the design of the equipment to which it is applied, it may be necessary to change the line thickness or to round off the corners of the symbol. The graphical designer is normally free to make such changes provided that the essential perceptual characteristics of the symbol be maintained. See 10.2 of ISO 3461-1:1988.

4.7 For actual use, all symbols shall be reproduced large enough to be easily discernible by the operator. See ISO 3461-1 for guidelines for proper sizing of symbols. Symbols shall be used in the orientations shown in this International Standard unless otherwise noted for individual symbols.

4.8 Symbols on controls and displays shall have good contrast to their background. A light symbol on a dark background is preferred for most controls. Displays may use either a light symbol on a dark background or a dark symbol on a light background, depending upon which alternative provides the best visual perception. When a symbol image is reversed (for example, black to white and vice versa) it shall be done for the entire symbol.

4.9 When using symbols with multifunction controls, understanding is improved and the presentation simplified where symbols are combined to the least extent possible. The example shown in Figure 1 is for a typical engine operation key switch, having separate positions for Off, On and Start.

4.10 The fonts shown in this International Standard are not intended to be restrictive; other fonts may be substituted, but care shall be taken that legibility is maintained.

4.11 Symbols in this International Standard are presented 32 % of original size. The grid marks “L” denote the corners of the 75 mm square of the graphic grid presented. The grid marks are not part of the symbol but are provided to ensure consistent presentation of all symbol graphics.

4.12 Microfiches of the symbols are available from the ISO/TC 145 Secretariat.

4.13 When used on optical indicators or tell-tales, the following colours have the meanings indicated:

— red: danger, unsafe or malfunction

— yellow or amber: caution

— green: safe or normal

NOTE Where practical, the indicators should be banded such that red is positioned above yellow/amber which is positioned above green.

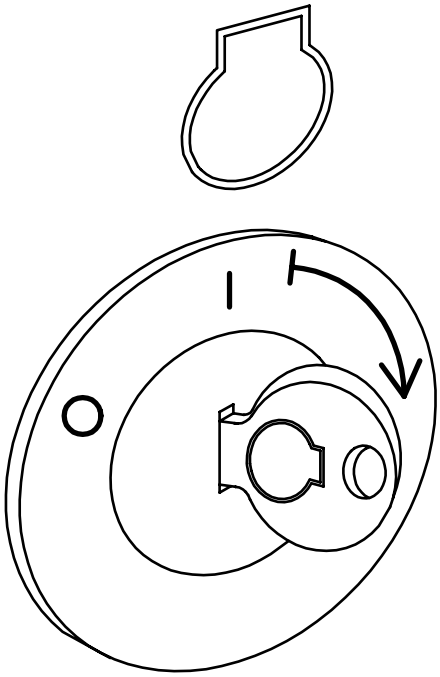
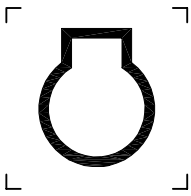
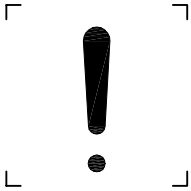
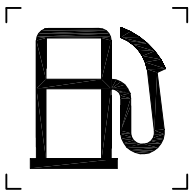
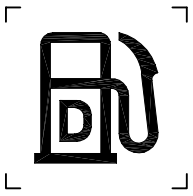
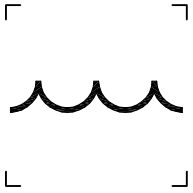
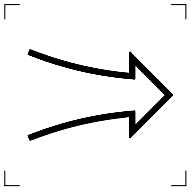
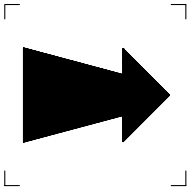
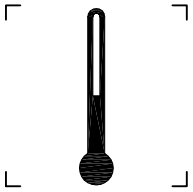
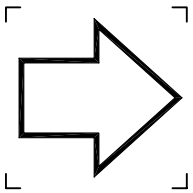
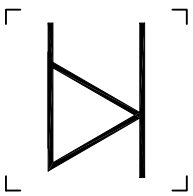
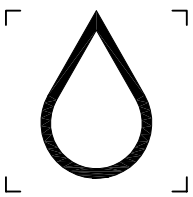
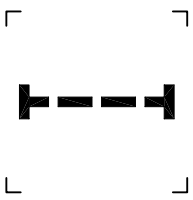
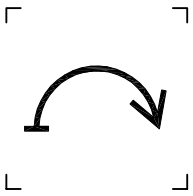
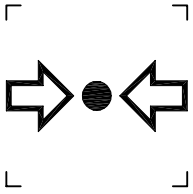
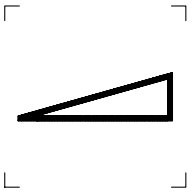
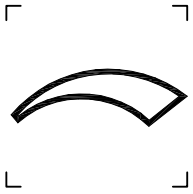
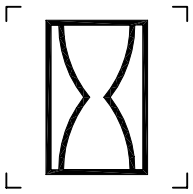
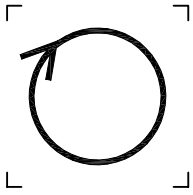
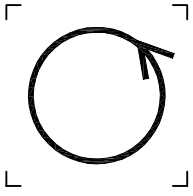


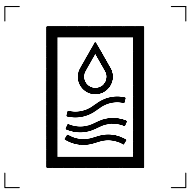
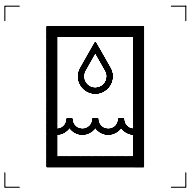
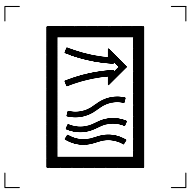
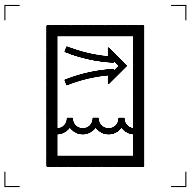
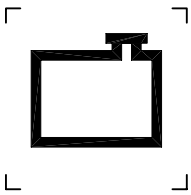
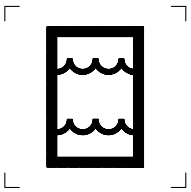
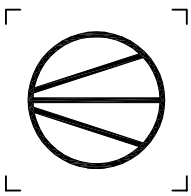
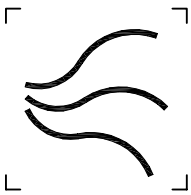
Figure 1 — Typical engine operation key switch

5 Basic symbols

No.	Symbol	Description	Application	ISO/IEC Registration No.
5.1		Engine	To signify functions associated with the engine.	ISO 7000-1156
5.2		Malfunction/failure	To indicate a possible malfunction/failure. A red colour indicator with a basic symbol may be used alternatively to indicate a malfunction/failure.	Variant (description and application) of ISO 7000-1603
5.3		Fuel	To signify the fuel quantity indicator. To signify functions associated with fuel. At the fuel fill to indicate a petrol type fuel	ISO 7000-0245B
5.4		Unleaded petrol fuel	To signify functions associated with fuel. At the fuel fill to indicate unleaded petrol fuel.	Variant of ISO 7000-0237

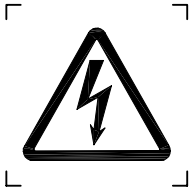
No.	Symbol	Description	Application	ISO/IEC Registration No.
5.5		Diesel fuel	To signify functions associated with fuel. At the fuel fill to indicate diesel fuel.	ISO 7000-1541
5.6		Liquid coolant	To signify functions associated with liquid type coolant. NOTE Use symbols associated with lubricating oil for engines with combined lubricating/cooling systems.	ISO 7000-0536
5.7		Intake air	To signify functions associated with intake air.	ISO 7000-1604
5.8		Exhaust gas	To signify functions associated with exhaust gas.	ISO 7000-1605
5.9		Temperature	To signify functions associated with temperature.	ISO 7000-0034
5.10		Flow/direction	To indicate the direction of a function. To signify functions associated with controls.	ISO 7000-0251
5.11		Level indicator	To signify a liquid level. NOTE This symbol should be used in the orientation shown. When used in composite symbols to indicate fluid levels, the vertical line at the apex of the pointer may be replaced by the appropriate symbol.	Application of ISO 7000-0159
5.12		Oil (lubricating)	To identify functions associated with lubricating oil.	ISO 7000-1056

No.	Symbol	Description	Application	ISO/IEC Registration No.
5.13		Filter	To signify functions associated with filtering.	ISO 7000-1369
5.14		Cranking	To signify functions associated with starting or cranking.	ISO 7000-1365
5.15		Pressure	To signify functions associated with pressure. NOTE When used in composite symbols, the appropriate symbol is used between the arrows to indicate the medium pressurised.	ISO 7000-1701
5.16		Continuous adjustment linear increase/decrease	To identify a linear control which regulates a quantity. The quantity increases with the symbol width.	IEC 60417-5004
5.17		Continuous adjustment linear increase/decrease	To identify a rotary control which regulates a quantity. The quantity increases with the symbol width. Radius is dependent on control diameter.	ISO 7000-1364
5.18		Elapsed hours	To indicate the cumulative elapsed hours of operating time.	ISO 7000-1366
5.19		Clockwise rotation	To indicate engine or equipment rotation in a clockwise direction.	ISO 7000-0258
5.20		Anti-clockwise rotation	To indicate engine or equipment rotation in an anti-clockwise direction.	ISO 7000-0937

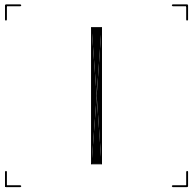
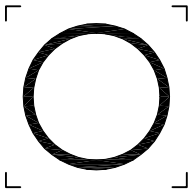
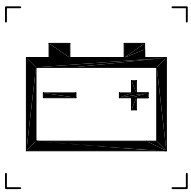
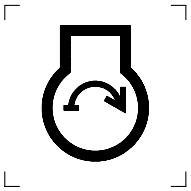
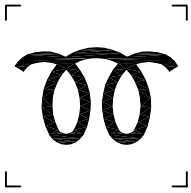
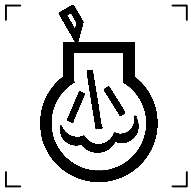
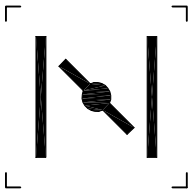
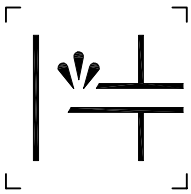
No.	Symbol	Description	Application	ISO/IEC Registration No.
5.21		Air-cooled lubricating oil cooler	To signify functions associated with lubricating oil coolers. Upper symbol is medium being cooled; lower symbol is cooling medium.	Variant (description and application) of ISO 7000-1542
5.22		Liquid-cooled lubricating oil cooler	To signify functions associated with lubricating oil coolers. Upper symbol is medium being cooled; lower symbol is cooling medium.	Variant (description and application) of ISO 7000-1543
5.23		Air-to-air charge air cooler	To signify functions associated with charge air coolers. Upper symbol is medium being cooled; lower symbol is cooling medium.	ISO 7000-1544
5.24		Air-to-water charge air cooler	To signify functions associated with charge air coolers. Upper symbol is medium being cooled; lower symbol is cooling medium.	ISO 7000-1545
5.25		Radiator	To signify functions associated with radiators for cooling engine coolant. Cooling medium is air.	ISO 7000-1390
5.26		Water-to-water heat exchanger (Keel cooler)	To signify functions associated with water-to-water heat exchangers. Upper symbol is medium being cooled; lower symbol is cooling medium.	ISO 7000-1546
5.27		Pneumatic system	To indicate a pneumatic system.	ISO 7000-0231
5.28		Air	To indicate functions associated with the use of ambient air.	ISO 7000-0537

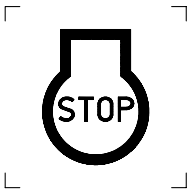
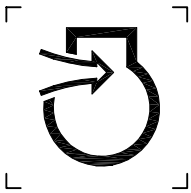
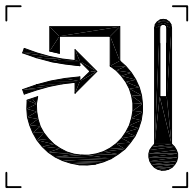
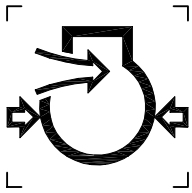
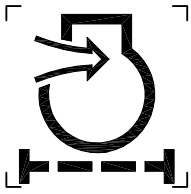
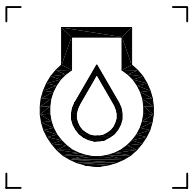
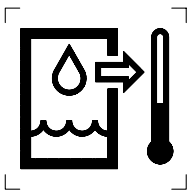
6 Safety signs

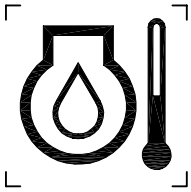
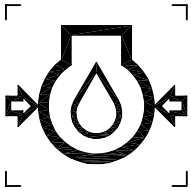
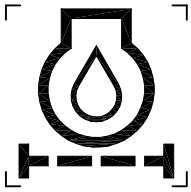
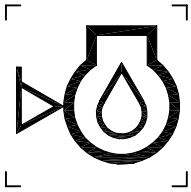
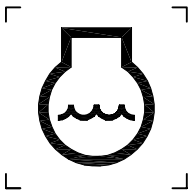
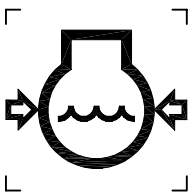
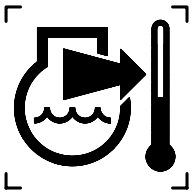
Safety signs shall be in accordance with ISO 3864.

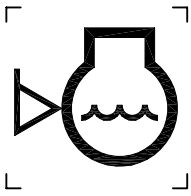
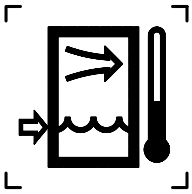
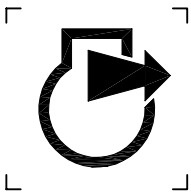
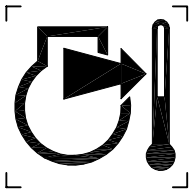
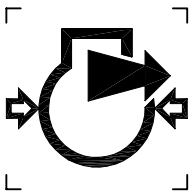
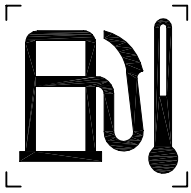
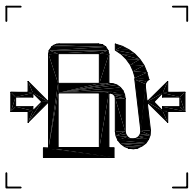
No.	Symbol	Description	Application
6.1		Caution/warning	To indicate a risk of personal injury.
6.2		Caution/warning: pressurized	To indicate a risk of personal injury from pressurized fluids.
6.3		Caution/warning: electrical hazard	To indicate a risk of personal injury from high voltage or current sources.
6.4		Caution/warning: temperature hazard	To indicate a risk of personal injury from high temperature.
6.5		No smoking	To indicate locations where smoking is hazardous and is therefore prohibited.
6.6		Fire risk	To indicate areas or materials which are a high fire risk.

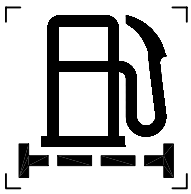
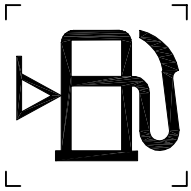
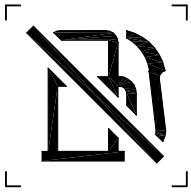
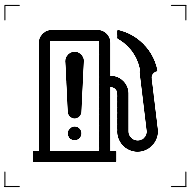
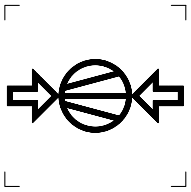
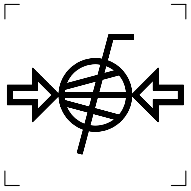
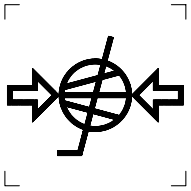
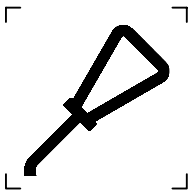
7 Engine symbols

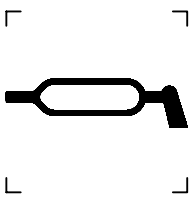
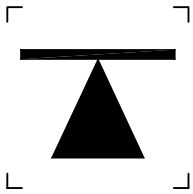
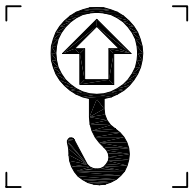
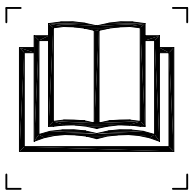
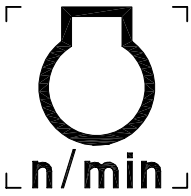
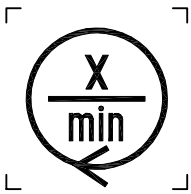
No.	Symbol	Description	Application	ISO/IEC Registration No.
7.1		On	To identify a control or control position to cause equipment to operate.	IEC-60417-5007
7.2		Off	To identify a control or control position to cease equipment operation.	IEC 60417-5008
7.3		Battery charging condition	To indicate the condition of battery charging.	ISO 7000-0247
7.4		Engine cranking	To indicate engine cranking or starting control. Recommended for use with single function controls on the engine start switch or start mechanism.	Variant (description and application) of ISO 7000-1387
7.5		Engine start aid, diesel preheat	To indicate the control to activate preheating of engine intake air.	ISO 7000-0457
7.6		Engine start aid, gas injection	To indicate the control to activate gas injection for starting.	ISO 7000-1547
7.7		Engine start aid, choke	To indicate the control to operate the choke.	ISO 7000-0243
7.8		Engine start aid, prime	To indicate the control to operate a fuel primer.	ISO 7000-1370

No.	Symbol	Description	Application	ISO/IEC Registration No.
7.9		Engine stop	To indicate the engine stop control. To indicate that the engine has stopped or should be stopped.	ISO 7000-1388
7.10	**Use of a red domed push-button control with no symbol, as standardized in IEC 60073**	Emergency engine stop	To indicate a control for stopping the engine quickly in case of an emergency.	–
7.11		Engine intake air	To indicate engine intake air.	ISO 7000-1381
7.12		Engine intake air temperature	To indicate engine intake air temperature.	ISO 7000-1383
7.13		Engine intake air pressure	To indicate engine intake air pressure.	ISO 7000-1382
7.14		Engine intake air filter	To indicate the engine intake air filter or filter condition.	ISO 7000-1170
7.15		Engine lubricating oil	To indicate engine lubricating oil. To identify the engine lubricating oil fill. NOTE When necessary to indicate oil type or classification, that indication should appear directly below the oil symbol; for example, for ISO-L-ESF the letters SF should be added.	Variant (description and application) of ISO 7000-1372
7.16		Liquid cooled lubricating oil cooler oil outlet temperature	To indicate the lubricating oil outlet temperature of the oil cooler.	Variant (description and application) of ISO 7000-1548

No.	Symbol	Description	Application	ISO/IEC Registration No.
7.17		Engine lubricating oil temperature	To indicate engine lubricating oil temperature.	Variant (description and application) of ISO 7000-1375
7.18		Engine lubricating oil pressure	To indicate engine lubricating oil pressure.	Variant (description and application) of ISO 7000-1374
7.19		Engine lubricating oil filter	To indicate engine lubricating oil filter or filter condition.	Variant (description and application) of ISO 7000-1376
7.20		Engine lubricating oil level	To indicate engine lubricating oil level.	Variant (description and application) of ISO 7000-1373
7.21		Engine coolant	To indicate liquid engine coolant. To identify the liquid engine coolant fill.	ISO 7000-1377
7.22		Engine coolant temperature	To indicate the liquid engine coolant temperature.	ISO 7000-1380
7.23		Engine coolant pressure	To indicate the liquid engine coolant pressure.	ISO 7000-1379
7.24		Engine exhaust gas coolant temperature	To indicate the temperature of water used to cool the engine exhaust gas.	ISO 7000-1549

No.	Symbol	Description	Application	ISO/IEC Registration No.
7.25		Engine coolant level	To indicate engine coolant level.	ISO 7000-1378
7.26		Charge air cooler, coolant inlet temperature	To indicate the liquid coolant temperature at the inlet to the charge air cooler.	ISO 7000-1550
7.27		Engine exhaust gas	To indicate engine exhaust gas.	ISO 7000-1384
7.28		Engine exhaust gas temperature	To indicate engine exhaust gas temperature.	ISO 7000-1386
7.29		Engine exhaust gas pressure	To indicate engine exhaust gas pressure.	ISO 7000-1385
7.30		Engine malfunction/failure	To indicate a possible malfunction/failure of the engine.	Variant (description and application) of ISO 7000-1371
7.31		Fuel temperature	To indicate fuel temperature.	ISO 7000-1394
7.32		Fuel pressure	To indicate fuel pressure.	ISO 7000-1392

No.	Symbol	Description	Application	ISO/IEC Registration No.
7.33		Fuel filter	To indicate the fuel filter or filter condition.	ISO 7000-1393
7.34		Fuel level	To indicate fuel level.	ISO 7000-1551
7.35		Fuel shut-off	To indicate the control for shutting off the fuel supply. Not to be used as engine stop symbol.	Variant of ISO 7000-1935
7.36		Fuel system malfunction	To indicate a possible fuel system malfunction.	ISO 7000-1391
7.37		Pneumatic system pressure	To indicate the pressure in a pneumatic system.	ISO 7000-1552
7.38		High pneumatic system pressure	To indicate that the pressure is too high in a pneumatic system.	ISO 7000-1553
7.39		Low pneumatic system pressure	To indicate that the pressure is too low in a pneumatic system.	ISO 7000-1554
7.40		Lubricate with oil	To indicate to lubricate with oil. To indicate oil lubrication points.	ISO 7000-0391

No.	Symbol	Description	Application	ISO/IEC Registration No.
7.41		Lubricate with grease	To indicate to lubricate with grease. To indicate grease lubrication points.	ISO 7000-0787
7.42		Jack support point	To indicate a jack or support point.	ISO 7000-0542
7.43		Lift point	To indicate a point at which to lift.	ISO 7000-1368
7.44		Operator's manual	To direct reference to an owner/operator handbook for additional information.	ISO 7000-0790
7.45		Engine rotational frequency (speed)	To indicate the number of revolutions per minute of the engine crankshaft or rotor.	ISO 7000-1389
7.46		Rotational frequency (speed)	To indicate the number of revolutions per minute of engine components, auxilliaries or output shafts operating at other than crankshaft or rotor speed.	ISO 7000-0010

Bibliography

[1] ISO 4196:1984, *Graphical symbols — Use of arrows.*

[2] ISO 7000:1989, *Graphical symbols for use on equipment — Index and synopsis.*

[3] IEC 60417-1:2000, *Graphical symbols for use on equipment — Part 1: Overview and application.*

[4] IEC 60417-2:1998, *Graphical symbols for use on equipment — Part 2: Symbol originals.*

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