

JIS

JAPANESE INDUSTRIAL STANDARD

**Machine tools—General rule
for lubrication**

JIS B 6016—1990

Translated and Published

by

Japanese Standards Association

Printed in Japan

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

JAPANESE INDUSTRIAL STANDARD

J I S

Machine tools - General rule for lubrication

B 6016-1990

1. Scope

This Japanese Industrial Standard specifies general matters concerning lubricants, lubrication system, lubrication appliances and lubrication control to be used for lubrication of machine tools.

Remraks 1. Applicable Standards to this Standard are shown in the following:

JIS B 0125 Graphical Symbols for Fluid Power Systems

JIS B 0202 Parallel Pipe Threads

JIS B 0203 Taper Pipe Threads

JIS B 0205 Metric Coarse Screw Threads

JIS B 0207 Metric Fine Screw Threads

JIS B 1575 Grease Nipples

JIS B 2351 210 kgf/cm² Bite Type Tube Fittings for Hydraulic Use

JIS B 6015 Electrical Equipment of Machine Tools

JIS B 6164 Compression Type Tube Fitting for Machine Tools

JIS B 8363 End Fittings and Adapters for Hydraulic Hose Assemblies

JIS B 8364 Textile Reinforced Rubber Hose Assemblies for Hydraulic Use

2. Corresponding International Standards to this Standard are shown in the following.

ISO 5169-1977 Machine tools - Presentation of lubrication instructions

ISO 5170-1977 Machine tools - Lubrication systems

3. In this Standard the units shown in { } are in accordance with the traditional units and, appended for informative reference.

Reference Standards:

JIS K 2001-Viscosity Classification for Industrial Liquid Lubricants

ISO TR 3498-1986 Lubricants, industrial oils and related products (class L) - Recommendation for the choice of lubricants for machine tools

2. Lubricants

Lubricants to be used for machine tools shall be in accordance with Attached Table 1.

Lubricants shall be selected with those suitable for machine tool and materials of parts to be used for machine tool.

3. Classification of Lubrication Systems

3.1 Classification According to Using Methods of Lubricating Oils
Using methods of lubricating oils shall be classified as follows:

- (1) Total Loss System The system to feed lubricating oil to lubrication point (contact surface to be performed with lubrication) and not to recover after lubricating.
- (2) Circulation System The system to feed lubricating oil to lubrication point and to return to reservoir after using for reusing. Static pressure system is contained also in this system. The static pressure system means the lubrication system to separate two surfaces by oil film according to the pressure of lubricating oil to be fed from outer part between the two surfaces.

3.2 Classification According to Feeding Systems of Lubricating Oils
Feeding systems of lubricating oils shall be classified as follows:

- (1) Individual Point System The system to feed lubricating oil by using manual portable equipment.
- (2) Centralized System The system to feed lubricating oil from a common source to machine tool having two or more lubrication points. For machine tools having many lubrication points it is preferable to use this method. As the restriction system to distribute lubricating oil, there are the following:
 - (2.1) Non-quantitative Type (Resistance type) The system to feed lubricating oil by using resistance type distributor which distribute in proportion to pressure and size of orifice to each lubrication point (Refer to No. 1 and No. 2 of Reference Table 1).
 - (2.2) Quantitative Type The system to feed lubricating oil of a definite amount to respective lubrication points without receiving influence of variation of pressure and viscosity by using computing distributor to distribute quantitatively, and there are the following:
 - (a) Single-Line Type The single-line type is the system to supply lubricating oil under intermittent pressure through single line pipework through a metering distributor to respective lubrication point (Refer to No. 3 of Reference Table 1).

In this system, in order to actuate the metering distributor, the main pipework must be depressurized.

- (b) Injection Type The system to supply the lubricating oil to lubrication point by using a metering distributor which acts by pneumatic pressure (Refer to No. 4 of Reference Table 1).
- (c) Two-line Type The system to supply lubricating oil through metering distributor to respective lubrication points by feeding oil alternately to two main pipeworks by direction-control valve (Refer to No. 5 of Reference Table 1).
- (d) Progressive Type The system to supply pressurized lubricating oil to respective lubrication points through metering distributor according to the preliminarily set sequence (Refer to No. 6 of Reference Table 1).
- (2.3) Multi Series Type The system to supply lubricating oil of metered quantities to lubrication points from respective outlets by using a pump having a number of outlets (Refer to No. 7 of Reference Table 1).
- (3) Other Systems
 - (3.1) As supply systems not using a pump, there are oil-bath system, sealing system, dropping-down system, flame-core system, etc.
 - (3.2) As special lubrication systems, there are the following:
 - (a) Oil-mist Type The system to supply lubricating oil to lubrication point by making the lubricating oil minute particles by using one piece of mist generator to float to an air stream and further by aggregating to effective oil particles through condenser (Refer to No. 8 of Reference Table 1).
 - (b) Oil-air Type The system to supply lubricating oil to lubrication point mixing the lubricating oil discharged from the metering distributor with compressed air in a mixing chamber, and by moving a minute quantity oil by using air stream (Refer to No. 9 of Reference Table 1).
 - (c) Jet Type The system to enhance the cooling effect of lubrication point by injecting the lubricating oil to lubrication point from the nozzle by using an oil supply pump (Refer to No. 10 of Reference Table 1).

4. Lubrication-circuit Figure

The lubrication-circuit figure shall be as follows:

- (1) The graphical symbols to be used for circuit figure are in accordance with Attached Table 2 and JIS B 0125.
- (2) The circuit figure indicates the pause condition of lubrication apparatus (the condition where all powers are cut, there is no circuit pressure and the starting preparation is completed).

- (3) Positions of graphical symbols must be easy in understanding of circuit.

Further, the position of graphical symbol is not required to be coincident with the actual position of drawn appliance.

- (4) The intersecting of pipeworks is preferable to be minimum limit.
- (5) On the circuit figure the name, type and manufacturer's name of each appliance are described.
- (6) The circuit figure should preferably be indicated with test port, and air vent portions.

5. Component Parts of Lubrication Appliances

5.1 Pumps

5.1.1 Marking Pumps shall be marked according to the legible and indelible method with the following matters:

- (1) Rotary direction or operating direction
- (2) Outlet and inlet
- (3) Displacing volume
- (4) Manufacturer's name
- (5) Type or type number
- (6) Manufacturing number

5.1.2 Mounting The mounting of the pump shall be as follows:

- (1) Mount the pump at a place where it is protected suitably and the maintenance and regulation can be performed easily.
- (2) Mount the manual type pump at a portion where the operation can be performed easily.

5.2 Distributor and Metering Distributer

5.2.1 Marking of Capacity The distributor and metering distributor shall be marked with rated discharge quantities of respective ports or for those capable of regulating, the maximum discharge quantity, marked.

5.2.2 Connection of Outlets Outlets of distributor and metering distributor shall not be connected with two or more places of lubrication points.

5.2.3 Mounting Positions The distributor and metering distributor shall be mounted at a position near the lubrication point.

Further, the regulatable distributor and metering distributor shall be mounted at the position easily approachable.

5.3 Reservoirs

5.3.1 Oil Reservoirs Oil reservoirs shall be as follows:

- (1) Capacity The oil reservoir must have the following capacity.
 - (1.1) Total Loss System The capacity not requiring supply of oil for at least 50 h.
 - (1.2) Circulating System
 - (a) The capacity capable of storing oil in the reservoir requiring for normal operation and the returning oil from the circuit naturally after stopping.
 - (b) The capacity and structure capable of dispersing the generating excessive heat.
- (2) Marking of Liquid Surface
 - (a) The oil reservoir must be marked with the highest and lowest liquid surfaces.

Further, the oil reservoir of circulating system should preferably be marked with also the highest liquid surface at normal operating.
 - (b) The liquid surface marking of oil reservoir of capacity of 0.5 l or more must be capable of confirming continuously between the highest and the lowest liquid surfaces.
 - (c) The level gauge must be mounted at an easily visible place for oil supply working person.
- (3) Liquid Surface Detection
 - (a) In the case of automatic supply system of total loss system, an alarm device for the lowest liquid surface must be provided.
 - (b) In the case of circulating system, such measures that when the lubricating oil lowered under the correct liquid surface the driving of machine body is stopped, must be provided.
- (4) Oil Supply Opening
 - (a) The oil supply opening of oil reservoir of 3 l or more in capacity must be of such structure as to prevent falling down of foreign matters.
 - (b) The oil supply opening must be such size as to be able to supply oil quickly for lubricating oil of whichever viscosity.
 - (c) The cover of the oil supply opening must be mounted with loss prevention.

- (d) The oil supply opening must be provided at a position easily capable of oil-supply working.
- (e) The oil supply opening to supply the same lubricating oil should preferably be attached with the common block capable of supplying oil easily.

(5) Vent Hole

- (a) The oil reservoir must be provided with a vent hole.
- (b) The vent hole should preferably be provided on the upper plate of oil reservoir.
- (c) The vent hole may be assembled in the oil supply opening.

(6) Oil Exhaust Opening

- (a) The oil reservoir of 3 l or more in capacity must be provided with an oil exhaust opening capable of exhausting quickly and completely.
- (b) The oil exhaust opening must be provided at a place capable of approaching easily.
- (c) Screw threads of drain plug are to be in accordance with JIS B 0202, JIS B 0203, JIS B 0205 or JIS B 0207.

- (7) Cleaning Window In order to make cleaning and maintenance of inside of oil reservoir easy, a cleaning window must be provided at a place near the hand or be made the structure capable of working easily.

- (8) Materials and Surface Treatment Materials and surface treatment of inside surface must be adequate for the lubricating oil to be used.

(9) Returning Pipe (in the case of circulating system)

- (a) The returning-pipe end in the oil reservoir should preferably be under the lowest liquid level of oil reservoir.
- (b) The returning-pipe end in the oil reservoir, in order to restrain the causes of bubbling and emulsification at the minimum limit, must be provided at a position apart from the suction opening as far as possible.
- (c) Heater In the case of using a heater, the consuming electric power must not exceed 0.7 W/cm^2 at the surface area of heating body.

5.3.2 Grease Reservoir The grease reservoir shall be as follows:

(1) Structure

- (a) The grease reservoir must be such structure as to feed the grease in the pump.
- (b) The grease reservoir must be made such structure as to be capable of air vent during filling of grease.
- (c) The grease reservoir must be made such structure that the inside cleaning can be performed easily.

(2) Liquid Level Indicating

- (a) The liquid level indicating of grease reservoir of 0.5 l or more in capacity must be capable of confirming continuously between the maximum and the minimum liquid levels.
- (b) The level gauge must be mounted at a place easily visible for the supply-oil operating person.

(3) Liquid Level Detection In the case of centralized whole automatic total loss system, the alarm device for the lowest liquid level must be provided.

(4) Oil-supply Opening

- (a) The lid of oil-supply opening must be attached with loss prevention.
- (b) The oil-supply opening must be of such size as to be capable of filling quickly the grease.
- (c) The oil-supply opening must be provided at such position that the oil-supply working can be performed easily.
- (d) In the case of filling by using supplementary pump, it should preferably be carried out through a filter.

(5) Materials and Surface Treatment Materials and internal surface treatment of grease reservoir must be those suitable for the grease to be used.

5.4 Piping

5.4.1 Hoses Hoses shall be as follows:

(1) Materials

- (a) Materials must be suitable for lubricating oil.
- (b) Hoses and metal fittings should preferably be in accordance with JIS B 8364 and JIS B 8363.