

# JIS

JAPANESE INDUSTRIAL STANDARD

General Rules for  
Hydraulic Systems

JIS B 8361 — 1982

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## JAPANESE INDUSTRIAL STANDARD

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## General Rules for Hydraulic Systems

B 8361-1982

1. Scope

This Japanese Industrial Standard specifies the hydraulic systems on machinery used in industrial manufacturing processes.

Also, this standard is specified as a guide for both manufacturers and purchasers, with a view to ensuring the following:

- (a) Safety of personnel
- (b) Ease and economy of maintenance
- (c) Uninterrupted production
- (d) Long life of equipment

Remarks 1. This standard has been established based on ISO 4413 Hydraulic fluid power — General rules for the application of equipment to transmission and control systems, and is identical to it in principle.

The parts which are different from ISO 4413 are clearly described under the articles provided as "References".

2. In this standard, the matters specified relating to safety are indicated with underlines to the titles or text concerned.

Besides, titles or parts of the text which are marked with an asterisk (\*) indicate items that need discussion between the purchaser and supplier to define the requirements and responsibility.

2. Applicable Standards

JIS B 0118-Glossary of Terms for Oil Hydraulics

JIS B 0125-Graphical Symbols for Fluid Power Diagrams

JIS B 8356-Filters for Oil Hydraulic Use

JIS C 4003-Classification of Materials for Insulation of Electrical Machinery and Apparatus

Reference: ISO 4413 refers to ISO 1219 Fluid power systems and components — Graphic symbols.

3. Terms

The principal terms used in this standard shall comply with JIS B 0118.

Reference: ISO 4413 provides as follows: "For the definition of terms used in this document, an International Standard is in preparation" (DIS 5598).

#### 4. General Requirements

The requirements stated in this clause apply to all equipment within the scope of this standard.

##### 4.1 Safety

4.1.1 Fail-Safe Concept When designing hydraulic circuits, all aspects of possible methods of failure (including control supply failure) shall be considered. In each case, components shall be selected, applied, fitted and adjusted so that in the event of a failure, maximum safety of personnel shall be the prime consideration, and damage to equipment minimized.

##### 4.1.2 Application Concept

- (a) All components within the system shall operate within their manufacturer's specification.
- (b) All parts of the system shall withstand the pressure generated, and shall also be protected against over-pressure by a relief valve, and the like ※<sup>1</sup>.
- (c) The system shall be designed and constructed so that components are located where they are accessible and can be safely adjusted and serviced.
- (d) Circuits shall be designed, constructed and adjusted to minimize surge pressures.
- (e) Surge pressure or loss of pressure shall not cause hazards.
- (f) The system shall be provided with protective measures against earthquakes ※<sup>2</sup>.

References ※<sup>1</sup> The parts "shall withstand the pressure generated" and "by a relief valve and the like" are not specified in ISO 4413.

※<sup>2</sup> This item is not specified in ISO 4413.

#### 4.2 Specification Requirements

4.2.1 Special Site Conditions\* The supplier and purchaser shall discuss any special site conditions, and the design of the system shall take account of these conditions.

Examples of information required are as follows:

- (a) variation, excessive contamination, high humidity,
- (b) siting of equipment at altitudes above 1000 m above sea level,
- (c) possible existence of fire hazard,
- (d) standard of maintenance available,

(e) electric network details, i.e. voltage and its tolerance, frequency, available power (if limited), etc.,

(f) protection for electrical devices.

#### 4.2.2 System Temperature

4.2.2.1 Heat Generation Hydraulic circuits shall be designed to minimize unnecessary heat generation.

4.2.2.2 Operating Temperatures\* The full range of ambient temperatures in which the equipment will be located shall be stated. The pump inlet temperatures should not exceed 60 °C for mineral oil when maximum ambient temperatures exist.

The equipment shall operate satisfactorily under conditions of minimum ambient temperatures. Special conditions may apply for other fluids.

#### 4.2.3 Maintenance Requirements

4.2.3.1 Equipment Location Hydraulic equipment and piping shall be accessible and fitted so as not to interfere with the adjustment or maintenance of the equipment. Particular attention shall be given to the location of equipment which needs regular maintenance.

4.2.3.2 Component Removal\* To facilitate maintenance, means shall be provided or components so fitted that their removal from the system for maintenance shall not

- (a) lead to excessive loss of fluid,
- (b) require draining of the reservoir,
- (c) necessitate extensive disassembly of adjacent parts.

4.2.3.3 Lifting Provisions All components, equipment or assemblies having a mass greater than 15 kg shall have accessibility and provision for lifting.

4.2.3.4 Equipment Installation All components shall be installed and used in accordance with manufacturer's recommendations.

#### 4.2.4 Layout Drawings

4.2.4.1 Floor and Foundations The supplier shall provide the purchaser with details of the floor plan and foundation requirements.

If there are two or more assemblies, the dimensional relationships shall be specified.

4.2.4.2 Piping\* Where requested on the purchaser's enquiry and confirmed on the supplier's quotation, a piping layout shall be furnished by the supplier. Photographs which clearly show the piping arrangement and assembly may be substituted for the layout by agreement.

4.2.5 Procurement of Equipment The purchaser should use commercially available parts (keys, bearings, packings, seals, washers, plugs, fasteners, etc.) and part configurations (shaft and spline sizes, port sizes, mountings, interface patterns, etc.) which are manufactured to Japanese Industrial Standards<sup>※</sup>, and which provide for uniform coding.

Reference <sup>※</sup> In ISO 4413, it is specified as "established International Standards".

4.2.6 Language\* The purchaser and supplier shall agree on the language to be used in technical data, and the supplier shall be responsible for ensuring that the translation has the same meaning as the original text.

Remark: This clause is applicable to an international trade only.

4.2.7 Maintenance Data The supplier shall provide the purchaser with maintenance data for all hydraulic equipment which clearly

- (a) describe start-up and shut-down procedures,
- (b) describe adjustment procedures,
- (c) indicate external lubrication points and the type of lubricant required,
- (d) state maintenance procedures for unique assemblies,
- (e) locate fluid level indicators, fill points, drains, filters, test points, magnets, etc., that require regularly scheduled maintenance,
- (f) give instructions for fluid maintenance,
- (g) give further identification of parts in the hydraulic components which are manufactured to a Japanese Industrial Standard<sup>※</sup>; the identification shall comply with the designation of the product as specified by the Japanese Industrial Standard<sup>※</sup> or the manufacturer's part number,
- (h) list recommended spare parts.

#### 4.2.8 Testing

4.2.8.1 Performance Tests Hydraulic systems shall be completely performance tested to determine compliance with this standard and the contract specifications.

4.2.8.2 Noise Limit\* Installed hydraulic equipment shall be in accordance with noise levels agreed at the time of contract.

4.2.8.3 Fluid Leakage There shall be no unintentional external leakage from the hydraulic system at the time of purchaser's acceptance.

4.2.9 Data to Be Provided by the Supplier

4.2.9.1 Final Data

- (a) Final diagrams, drawings, and texts, including the maintenance data, shall conform to the equipment shipped and be forwarded to the purchaser not later than the time of equipment delivery.
- (b)\* Where requested on the purchase order or the enquiry, final diagrams and drawings shall be on reproducible material which shall not be folded.

4.2.9.2 Maintenance Manuals\* The supplier shall advise the purchaser regarding the availability of maintenance manuals for standard equipment [as described in 4.2.7 (g) and (h)].

4.2.9.3 Modifications Whenever modifications are made by the supplier, they shall be recorded and the purchaser shall be notified.

4.2.10 Preparation for Transportation

4.2.10.1 Identification of Piping Where construction of the equipment requires transporting in sections, removed piping runs and their corresponding terminal ports and/or connectors shall be identically marked.

4.2.10.2 Packaging\* All equipment shall be packaged in a manner that protects it from damage and distortion, and preserves its identification during transportation.

4.2.10.3 Sealing of Openings Exposed openings in hydraulic equipment shall be sealed, and male threads shall be protected during transportation and these seals only removed immediately prior to reassembly. Only sealing caps that require their removal before reassembly can take place shall be used.

4.3 Presentation of Technical Data

4.3.1 Circuit Diagrams

- (a) Circuit diagrams shall use symbols specified in JIS B 0125.

Reference: ISO 4413 provides as follows: "An International Standard is in preparation for graphic representation of pipelines".

(b) The symbols shall, unless otherwise indicated, represent units at rest (i.e. all power off, circuits depressurized and ready-for-start).

(c) Symbols shall be positioned on the diagram so that the circuit is easy to follow.

It is not necessary for the symbol position to correspond to the physical location of the device depicted.

(d) Cross-over of lines should be kept to a minimum.

(e) Each item on the circuit diagram shall have a separate designation or identification (see 4.4.2 and 4.4.4.1).

(f) Ports, test points, bleed points and orifice fittings should be identified (see 4.4.3 and 7.2.6).

(g) Flow lines between power units and machines shall be identified at both ends.

**4.3.2 Technical Data** The following information shall be included on or with the circuit diagram:

(a) identification of all hydraulic equipment by name, catalogue number, serial or design number, and the manufacturer's name,

(b) size, wall thickness and specification of pipe, tube and hose lines,

(c) diameter of each cylinder piston and rod, the length of stroke, the estimated force and the speed required for the intended service,

(d) displacement per revolution, the torque output, speeds and direction of rotation required for the intended service of each hydraulic motor,

(e) rate or rates of flow, and the direction of rotation of each pump looking at the driven shaft end,

(f) power, rotational frequency, and the type of each pump drive motor,

(g) pressure setting of each pressure control valve,

(h) types of strainers, and preferably details and quantity of replacement elements,

(i) volume of fluid required to fill the system to maximum level,

(j) recommended fluid type and viscosity range,

(k) when specified, the time sequence chart, and data or text, or both, showing the operations performed including the function(s) of the related electrical and mechanical controls and actuating equipment,

(l) clear indication of any circuitry contained within circuit manifolds; where boundary lines or boundary envelopes are used for this purpose, the boundary indicated shall not include any symbol of a component not mounted on or within the circuit manifold,

- (m) clear indication of the function of each actuator in each direction,
- (n) pre-charge pressure and nominal volumes of accumulators,
- (o) size, type and location of test and bleed points in the circuit,
- (p) identification of all components or manifold ports (as marked on the component),
- (q) expected flow-rate and maximum and minimum pressure of the cooling media, and the maximum temperature of the cooling media supply.

#### 4.4 Identification

4.4.1 Components The following particulars shall be shown in a permanent and readily visible form on all components:

- (a) manufacturer's name and brief address,
- (b) manufacturer's type or model number,
- (c) symbols according to JIS B 0125, and all ports correctly identified.
- (d) safe maximum continuously-rated pressure.

Where lack of available space would result in lettering too small to be legible, information may be restricted to a minimum of manufacturer's name and type or model number.

In addition, the specific particulars indicated in Table 1 shall be shown.

4.4.2 Components within a System Each hydraulic component shall be allocated an item number and/or letter. This item number shall be used to identify the component on all diagrams, lists and layouts. It should be plainly and permanently marked on the installation adjacent to, but not on, the component.

4.4.3 Ports Component ports, including pilot ports, test and bleed points, etc., shall be plainly and permanently indicated and the same identification used on the circuit diagram.