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**Earth-moving machinery — Safety —
Part 3: Requirements for loaders**

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Health, Labour and Welfare and the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee as the result of proposal of revision of Japanese Industrial Standard submitted by Japan Construction Machinery and Construction Association (JCMA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS A 8340-3 : 2007** is replaced with this Standard.

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Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, applications for a patent after opening to the public or utility model rights. The relevant Ministers and the Japanese Industrial Standards Committee are not responsible for identifying any of such patent rights, applications for a patent after opening to the public or utility model rights.

JIS A 8340 series consists of the following six parts under the general title “*Earth-moving machinery—Safety*”:

Part 1: General requirements

Part 2: Requirements for bulldozers

Part 3: Requirements for loaders

Part 4: Requirements for hydraulic excavators

Part 5: Requirements for dumpers

Part 6: Requirements for cable excavators

Part 7: Requirements for graders

Earth-moving machinery — Safety — Part 3 : Requirements for loaders

Introduction

This Japanese Industrial Standard has been prepared based on the first edition of **ISO 20474-3** published in 2008 with some modifications of the technical contents.

The portions given sidelines or dotted underlines are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with explanations is given in Annex JD. Annex JA to Annex JC are not contained in the corresponding International Standard.

This Standard is a type-C standard (machine safety standards) as stated in **JIS B 9700-1**.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the scope of this Standard.

When requirements of this type-C standard are different from those which are stated in type-A or -B standards, the requirements of this type-C standard take precedence over the requirements of other standards.

1 Scope

This Standard gives the safety requirements specific to loaders as defined in **JIS A 8308**, as well as those for derivated machinery.

Snow removing loaders are specified in a separate standard.

This Standard is intended to be used in conjunction with **JIS A 8340-1**, which specifies general safety requirements common to earth-moving machine families. The specific requirements given in this Standard take precedence over the general requirements of **JIS A 8340-1**. This Standard deals with all significant hazards, hazardous situations and events relevant to the loaders within its scope when used as intended for under conditions of misuse reasonably foreseeable by the manufacturer (see Annex JA of this Standard and Annex JA of **JIS A 8340-1**). It specifies the appropriate technical measures for eliminating or reducing risks arising from significant hazards, hazardous situations or events during commissioning, operation and maintenance.

Any loader to travel on public roads shall also comply with the laws and regulations relevant to road traffic provided by the national or local government.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 20474-3 : 2008 *Earth-moving machinery — Safety — Part 3 : Requirements for loaders* (MOD)

The symbols which denote the degree of correspondence in the contents

in the corresponding International Standard and **JIS** are IDT (identical), MOD (modified) and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS A 8302 *Earth-moving machinery — Access systems*

NOTE : Corresponding International Standard : **ISO 2867** *Earth-moving machinery — Access systems* (IDT)

JIS A 8307 *Earth-moving machinery — Guards — Definitions and requirements*

NOTE : Corresponding International Standard : **ISO 3457** *Earth-moving machinery — Guards — Definitions and requirements* (IDT)

JIS A 8308 *Earth-moving machinery — Basic types — Vocabulary*

NOTE : Corresponding International Standard : **ISO 6165** *Earth-moving machinery — Basic types — Identification and terms and definitions* (IDT)

JIS A 8312 *Earth-moving machinery — Safety signs and hazard pictorials — General principles*

JIS A 8317-1 *Earth-moving machinery — Determination of sound power level — Dynamic test conditions*

JIS A 8317-2 *Earth-moving machinery — Determination of emission sound pressure level at operator's position — Dynamic test conditions*

JIS A 8318 *Earth-moving machinery — Seat index point (SIP)*

JIS A 8320 *Earth-moving machinery — Methods of measuring the masses of whole machines, their equipment and components*

NOTE : Corresponding International Standard : **ISO 6016** *Earth-moving machinery — Methods of measuring the masses of whole machines, their equipment and components* (IDT)

JIS A 8340-1 *Earth-moving machinery — Safety — Part 1 : General requirements*

NOTE : Corresponding International Standard : **ISO 20474-1** *Earth-moving machinery — Safety — Part 1 : General requirements* (MOD)

JIS A 8407 *Earth-moving machinery — Zones of comfort and reach for controls*

NOTE : Corresponding International Standard : **ISO 6682** *Earth-moving machinery — Zones of comfort and reach for controls* (MOD)

JIS A 8421-1 *Earth-moving machinery — Loaders — Part 1 : Terminology and commercial specification*

NOTE : Corresponding International Standard : **ISO 7131** *Earth-moving machinery — Loaders — Terminology and commercial specifications* (IDT)

JIS A 8421-3 *Earth-moving machinery — Loaders — Part 3 : Bucket volumetric ratings*

JIS A 8421-4 *Earth-moving machinery — Loaders — Part 4 : Test method to measure breakout forces and lift capacity*

NOTE : Corresponding International Standard : **ISO 14397-2** *Earth-moving machinery — Loaders and backhoe loaders — Part 2 : Test method for measuring breakout forces and lift capacity to maximum lift height* (IDT)

JIS A 8421-5 *Earth-moving machinery — Loaders — Part 5 : Calculation and verification methods for rated operating loads*

NOTE : Corresponding International Standard : **ISO 14397-1** *Earth-moving machinery — Loaders and backhoe loaders — Part 1 : Calculation of rated operating capacity and test method for verifying calculated tipping load* (IDT)

JIS A 8910 *Earth-moving machinery — Roll-over protective structures — Laboratory tests and performance requirements*

JIS A 8911 *Earth-moving machinery — Seat belts and seat belt anchorages — Performance requirements and tests*

JIS A 8920 *Earth-moving machinery — Falling-object protective structures — Laboratory tests and performance requirements*

ISO 2330 *Fork-lift trucks — Fork arms — Technical characteristics and testing*

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS A 8308**, **JIS A 8340-1** and **JIS A 8421-1** and the following apply (see [Annex A](#)).

3.1 loader

self-propelled crawler or wheeled machine having front-mounted equipment primarily designed for loading operation (bucket use), which loads or excavates through forward motion of the machine (see [figure A.1](#) and [figure A.2](#))

NOTE 1 A loader work cycle normally comprises filling, elevating, transporting and discharging material (see **JIS A 8308**).

NOTE 2 Derivated machinery : loaders can also be used for derivated applications (see **JIS A 8340-1**, 3.1.2).

3.2 compact loader

loader with an operating mass as defined in **JIS A 8320** of 4 500 kg or less designed to work in confined spaces with the associated needs for greater maneuverability (see [figure A.3](#))

3.3 skid steer loader

loader normally having an operator station between attachment-supporting structures and steered by using variation of speed or direction of rotation between traction drives

on opposite sides of a machine with fixed axles or with tracks (see figure A.4)

3.4 swing loader

loader having a swing-type lift arm with a swinging angle to the left and right from a straight position (see figure A.5)

NOTE : A swing loader work cycle is normally similar to a loader cycle except that, additionally, work can be done offset of the machine track.

3.5 hydraulic lift capacity

maximum mass that can be lifted in any arm position (with the fork in horizontal position, if equipped with a fork) limited by the hydraulic circuit working pressure according to JIS A 8421-4

3.5A derivated machinery

crawler or wheeled loader equipped with the attachment for different use without changing the safety requirements for the loader equipped with the bucket (see figure A.6 to figure A.8)

3A List of significant hazards inherent in loaders

All the hazards, hazardous situations and hazardous events that are identified as significant hazards inherent in loaders by risk assessment, and that require measures to eliminate or reduce the risks generated therefrom are listed in Annex JA.

4 Safety requirements and/or protective measures

4.1 General

Loaders shall conform to the safety requirements and protective measures specified in JIS A 8340-1, and the requirements specific to loaders given in this clause.

Requirements for loaders to be used for underground works in non-explosive ambience shall be as given in Annex JC.

4.2 Skid steer loader

For skid steer loaders of which the operator's entrance is through an entrance on the front side of the machine, JIS A 8302 shall apply.

4.3 (Deleted)

4.3A Additional seat

Additional seat shall be in accordance with JIS A 8340-1, 4.4.2, and the structure standard for vehicle-type construction machine based on Article 42 of the Industrial Safety and Health Act.

4.4 Rear windows

JIS A 8340-1, 4.3.2.7 and 4.3.2.9 shall apply, with the exception that no motorized wiper(s) and washers are required for loaders with a cab width not more than 750 mm, measured outside of the cab to the height of the SIP as specified in JIS A 8318.

4.5 Operator protective device

4.5.1 Roll-over protective structure (ROPS)

To roll-over protective structure (ROPS), JIS A 8340-1, 4.3.3 shall apply with the following exceptions:

Inapplicable to loaders equipped with a cab or canopy the total height of which is restrained low by reason of height limitation and, therefore, incapable of securing the deflection-limiting volume (DLV) (e.g. agriculture and livestock specification, and tunnel specification).

In the case where the compact loader satisfies the required minimum energy value, the part above the reference axis LA passing through SIP of the deflection-limiting volume (DLV) (as specified in JIS A 8910) may be inclined by a maximum of 15° sideward as shown in figure 1. The lower part than LA (SIP) of DLV may be ignored.

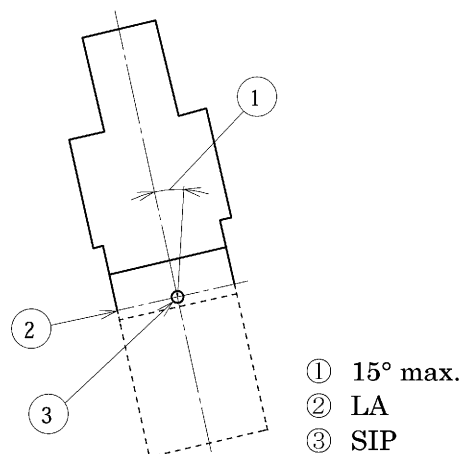


Figure 1 Sideward inclination limit of deflection-limiting volume (DLV)

4.5.2 Falling-object protective structure (FOPS)

To falling-object protective structure (FOPS), JIS A 8340-1, 4.3.4 shall apply with the following exceptions:

Inapplicable to loaders equipped with a cab or canopy the total height of which is restrained low by reason of height limitation and, therefore, incapable of securing the deflection-limiting volume (DLV) (e.g. agriculture and livestock specification, and tunnel specification).

Compact loaders of the operating mass not exceeding 700 kg (see JIS A 8320) shall be designed and manufactured so that attachment of FOPS having the performance of Level 1 specified in JIS A 8920 is possible.

4.5.3 Fenders

To fenders, of JIS A 8340-1, 4.14.7 shall apply, except that it does not apply to skid steer loaders of which the entrance is on the front face of the machine (excluding those with the entrance on the side face of the machine).

4.5.4 Controls and indication

To skid steer loaders of which the entrance is on the front face of the machine (excluding those with the entrance on the side face of the machine), JIS A 8340-1, 4.5 shall apply with the following exceptions :

The following controls are restricted not to act mechanically when the operator gets on or off the operator's station by, for example, a safety bar (set up in the front of the operator's station, the opening and closing of which is interlinked with the controlling device) or automatically stopped :

- device for lifting and lowering of the lift arm;
- device for moving the body of the machine;
- device for moving the attachment operated hydraulically (for example, multi-purpose bucket).

4.5.5 Guard of skid steer loader

Skid steer loaders the entrance of which is on the front face of the machine (excluding those with the entrance on the side face) shall be equipped with a side guard for preventing the operator from being stuck between the structure of the machine body and the arm moving up and down when the operator takes the seat. The opening part of the side guard is as specified in JIS A 8307.

NOTE : If the side guard is likely to be a source of danger to restrict the sight field of the operator, the dimensions specified in JIS B 9707 may be altered as appropriate.

For the lower limbs, guards are required within the zone of reach as specified in JIS A 8407 and shall have a minimum height of 200 mm from the floor plate.

4.5.6 Restraint device of skid steer loader

JIS A 8340-1, 4.4.1.5 shall apply, except that the safety bar (see 4.5.4), if found to be in compliance with the standard test in JIS A 8911, may be regarded as a restraint device of the skid steer loader.

4.6 Stability

4.6.1 General

For stability, JIS A 8340-1, 4.11 and 4.6.2 to 4.6.7 shall apply.

All the rated capacities given in 4.6.2 to 4.6.7 below are based on the test and/or calculation results which assume the machine to be on the horizontal and solid ground.

In the determination of the size or capacity of the rated loading mass and working device, the mass of the load and the position of the gravity centre shall be taken into account together with the mass of the working device and if any, quick coupling device.

4.6.2 Bucket specification

The rated loading mass shall be as follows :

- to the roll-over loading mass and the rated loading mass, JIS A 8421-4 and JIS A

8421-5, respectively, apply:

— the capacity of the bucket is as specified in JIS A 8421-3.

NOTE : The capacity of the bucket and the concentration of the object are considered according to the use of the bucket.

4.6.3 Fork specification

4.6.3.1 General

The rated loading mass shall be determined according to 4.6.3.2 to 4.6.3.5 according to the fork specification.

4.6.3.2 Rated mass

The roll-over loading mass shall be determined on the basis of JIS A 8421-4 and JIS A 8421-5 (excluding 4.2) in a state of the fork kept horizontal. The rated mass shall not exceed the values given in table 1 with respect to the roll-over loading mass.

Table 1 Stability factor in the use of fork

Rate of rated mass to roll-over loading mass			
Road condition	Wheeled loader	Skid steer loader	Crawler loader
On the horizontal solid soil	80 %	50 %	35 %

4.6.3.3 Hydraulic lift capacity

The hydraulic lift capacity of the fork shall be such that the rated loading mass at any position the manufacturer considered at the time of design can be operated.

4.6.3.4 Rated loading mass

The rated loading mass shall be either of the rated mass in 4.6.3.2 or the hydraulic lift capacity stated in 4.6.3.3, whichever is the smaller.

4.6.3.5 Fork dimensions

For the selection of the size of the fork arm and for the determination of the distance (D) to the gravity centre (G) of the load shown in figure 2, the standards in table 2 shall be used.

Table 2 Distance to the gravity centre of the load

Load F N	Distance D (mm)
$F \leq 10\,000$	400
$10\,000 < F \leq 50\,000$	500
$50\,000 < F \leq 100\,000$	600
$100\,000 < F \leq 200\,000$	900
$F > 200\,000$	1 200