International Standard 6749

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Earth-moving machinery — Preservation and storage

Engins de terrassement — Conservation et stockage

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6749 was developed by Technical Committee ISO/TC 127, *Earth-moving machinery.*

The first edition (ISO 6749-1981) had been approved by the member bodies of the following countries:

Australia	Finland	Romania
Austria	France	South Africa, Rep. of
Belgium	Germany, F.R.	Sweden
Bulgaria	Italy	United Kingdom
Chile	Japan	USA
Czechoslovakia	Poland	USSR

No member body had expressed disapproval of the document.

This second edition, which cancels and replaces ISO 6749-1981, incorporates draft Amendment 1, which was circulated to the member bodies in July 1983 and has been approved by the member bodies of the following countries:

Australia	Egypt, Arab Rep. of	Romania
Austria	France	Sweden
Belgium	Germany, F.R.	United Kingdom
Bulgaria	Italy	USA
Canada	Japan	USSR
Czechoslovakia	Poland	Yugoslavia

No member body expressed disapproval of the document.

Earth-moving machinery — Preservation and storage

1 Scope

This International Standard specifies the general methods for preservation and removal of preservation materials from earth-moving machinery and its elements, and the categories of storage and transportation conditions.

2 Field of application

This International Standard is applicable to newly-manufactured earth-moving machines as well as to those already in use to be preserved.

3 Definitions

For the purpose of this International Standard, the following definitions apply :

3.1 preservation : Set of operations to be carried out by the manufacturer, the user and others for the purpose of protecting a machine against the corrosive action of the environment and against minor damage that might occur during handling, transportation and storage.

3.2 transportation : Conveyance of a machine by any mode of transport, i.e., rail, road, sea, river and air.

3.3 storage : Period during which a machine is kept idle from the moment preservative is applied until the moment the preservative is removed.

3.4 removal of preservatives : Set of operations to be carried out by the dealer, the user and/or others prior to putting a machine into service.

4 Preservation

4.1 General

4.1.1 Preservation treatment consists of preliminary operations possibly involving some dismantling, marking, preparation for preservation, the preservation proper, and final packaging.

4.1.2 Preservation of a newly manufactured machine and its elements, unless otherwise stipulated in the order or the contract of sale, shall be carried out by the manufacturer.

4.1.3 All materials used for the preservation of a machine and its elements shall conform to the specifications laid down in International Standards or other appropriate technical documents specified in the order or contract of sale, and shall ensure conservation of a machine for the intended period of preservation.

4.1.4 A machine shall be delivered for preservation treatment without any traces of corrosion on metal surfaces, or damage to paintwork, metallic, or other coatings.

A used machine shall be reconditioned prior to preservation.

4.1.5 Preservation treatment shall be carried out in suitable conditions (ambient temperature, humidity) and with the correct materials which provide for the required quality of preservation while taking due care to ensure the safety of personnel and protection of the environment.

4.1.6 Each machine given the preservation treatment shall be provided with instructions for the removal of preservatives.

These instructions may be included as a separate chapter in the operator's manual.

4.1.7 The instructions for preservation and removal of preservatives shall be packed in a labelled waterproof envelope and attached to the machine in a conspicuous place.

4.1.8 The instructions for removal of preservatives shall specify the categories of conditions for storage and transportation, the date of preservation, and the duration of validity of preservation.

The instructions shall also specify the methods for the removal of preservatives and reassembly of dismantled elements, a list of tools and appliances needed for these operations.

4.1.9 Operations of preservation and removal of preservatives shall be carried out with due regard for the general accident prevention measures specified, if necessary, by the national governing body having jurisdiction.

4.1.10 Full details concerning preservation, packing and transportation shall be specified by the manufacturer in special instructions included with the machine documentation upon request, for example

a) a method of lifting the machine for loading and/or unloading in order to keep preservatives intact;

b) particular requirements, such as operations necessary when a machine is to be transferred from one mode of transportation to another which may require unpacking, including a procedure for re-preservation.

4.1.11 It is important to ensure that tyres, hoses, etc. are protected against damage or deterioration by preservatives, by solvents used near them, and by exposure to the sun, moisture and other natural occurrences.

4.2 Preliminary operations

4.2.1 Partial dismantling and marking

4.2.1.1 Partial dismantling shall be kept to a minimum and shall be carried out :

a) to give preservation treatment to inaccessible areas;

b) to safeguard protruding elements or easily damageable parts against damage or loss; and

c) to bring down the overall dimensions of a machine within the limits of transportation size specified in International Standards or other documents specified in the order or contract of sale.

4.2.1.2 When dismantled elements are to be attached to the base machine they shall be so secured that they may not shift or be damaged or lost during handling or transportation.

4.2.1.3 Fastenings used to attach the dismantled elements shall also be given the preservation treatment, and wherever possible, shall be secured to appropriate mating surfaces to guard against loss.

4.2.1.4 Dismantled elements and their corresponding mating surfaces on the base machine may be appropriately marked to guide correct reassembly. Tags used for marking dismantled elements should be of waterproof material.

4.2.2 Preparation of surfaces for preservation

4.2.2.1 Surfaces of a machine and its dismantled elements requiring protection shall be cleaned and be free of corrosion, oil, and other contaminants, and dried.

4.2.2.2 Aqueous alkali solutions, organic solvents, blasting with abrasives or any other suitable means which ensure the required degree of cleanliness and do not cause damage to the machine can be used for cleaning and degreasing the outer surfaces.

The cleaning method shall be chosen depending on the structural features and degree of soiling and the type of outer coatings present.

4.2.2.3 Preparation of surfaces by means of alkali solutions shall be carried out in washing installations with such solutions and by such procedures that ensure the required degree of cleanliness and degreasing.

4.2.2.4 If organic solvents are used, the areas to be preserved shall be wiped with soft rags or brushes wetted with solvent.

4.2.2.5 If blasting with abrasives is used, the surfaces shall be cleaned by blowing with a high-velocity jet of water or air containing fine abrasive particles.

4.2.2.6 After cleaning, the surfaces shall be thoroughly dried to remove traces of solvents and moisture by one of the following methods :

a) blowing with a jet of filtered, dry, compressed air;

b) heating in a temperature-controlled oven;

c) wiping with clean rag or paper; or

d) subjecting to the action of IR rays or any other suitable means that will not damage the surfaces.

4.3 Preservation procedures and types of protective coatings

4.3.1 The preservation method and the type of protective coating shall be chosen depending on the structural features and the materials of the machine, preservation duration, storage and transportation conditions with due regard for the amount of labour needed and the availability of materials required for removing the preservative coatings.

4.3.2 Preservative coatings shall be applied to those metallic surfaces which, if corroded, may deteriorate the operational qualities of the machine or detract from its external appearance.

4.3.3 The surfaces of non-vital parts or those of corrosion-resistant metals such as copper, nickel, chromium, and bronze need not be treated, unless transported by sea.

Special attention should be given to protecting electrical system junction boxes, switches, relays, etc. Permanent protective coatings should be applied during the assembly process.

4.3.4 Recommended preservation methods

4.3.4.1 Inhibitor coatings

Protective inhibitor coatings recommended are inhibitor paper, alcohol or alcohol-aqueous solutions of inhibitors, and powdery or other forms of inhibitors capable of protecting the machine surfaces.

4.3.4.1.1 Protection by inhibitor paper : constituent parts of machines may be completely wrapped in inhibitor paper with sufficient overlapping at joints.

To protect the elements of heavy machines of complicated configuration with inhibitor paper, an additional outer protective layer such as PVC film, metallic foil, etc. may also be used.

4.3.4.1.2 Alcohol or aqueous-alcohol solutions of vapour phase inhibitors or powdery inhibitors can be applied to preserve closed cavities which need to be airtight in the course of operation.

After treating with inhibitor solutions, excess solution shall be removed and the machine or its elements dried until the inhibitor crystallizes on the preserved surfaces. All ports and cavities shall be covered with inhibitor paper or glued with an adhesive polymer film and sealed.

4.3.4.2 Preservation with oil or dope coatings

4.3.4.2.1 Preservation of outer surfaces with an oil coating shall be carried out by dipping, spraying or other suitable method. After the outer surfaces have been treated with oil, excess oil shall be allowed to drain away.

4.3.4.2.2 Preservation of inner surfaces shall be carried out by pouring oil into the cavities and subsequently rotating the corresponding moving parts of the machine, or by pumping oil into the system to be preserved, or by any other suitable means of applying the preserving oil. In this process, care should be taken that a uniform film of oil is applied to all surfaces being treated. Excess oil shall be allowed to drain away.

4.3.4.2.3 Inner surfaces of hydraulic systems operating on inhibited hydraulic fluids shall be preserved by filling these systems with the appropriate operating fluids.

4.3.4.2.4 Preservative dopes in molten state or dissolved in white spirit shall be applied to the machine surfaces by spraying, coating or other suitable means which ensure the required quality of preservation.

4.3.4.2.5 Any defect detected in the preservative coating shall be eliminated by applying the same oil or dope.

4.3.4.3 Application of inhibitor polymer dopes on machine surfaces can be carried out by any suitable method which ensures a uniform coating without any discontinuities or inclusions.

4.3.4.4 To protect against the influence of the sun, rubber elements shall be preserved by coating with light-proof compounds by means of a brush or by spraying or any other suitable method which ensures the required quality of preservation.

4.3.5 Other suitable preservation methods can also be practised, or a combination of two or more preservation methods applied, provided such a procedure does not cause damage to the machine.

4.3.6 Preservatives may be removed by one of the methods recommended in table 1 or by any other suitable method which does not cause damage to, or detract from, the external appearance of the machine.

Table 1 — Methods recommended for removal of preservatives

Preservation method	Removal method
Inhibitor coating on the surface	Unwrap inhibitor paper, blow the cavities with hot, dry air or wash with soap-soda solution
Oil or dope coating on the surface	Cleanse with hot water, detergent solution or wipe with organic solvents and then wash with hot water or detergent solution
Inhibitor polymer coating on the surface	Peel off polymer film by cutting at a suitable point
Coating of light-proof compound on rubber surface	Wash with detergent

4.4 Packaging

4.4.1 Packaging is classified into protective and transport packing.

4.4.2 Protective packing is carried out to prevent or to inhibit penetration of moisture or corrosive gases, to delay diffusion of inhibitor vapours into outer space and to retain the inhibitor oil or dope on the machine surfaces, and to protect the machine against termites and rodents in the course of transportation or during storage.

4.4.2.1 The material and the type of protective packing shall be chosen depending on the preservative applied, storage duration and transportation conditions. Packing materials recommended are waterproof paper, film, and sealing compounds.

4.4.2.2 Partial packing can be practised for machine surfaces of complicated configurations.

4.4.2.3 If a machine is wrapped in paper or in film, the edges shall overlap each other, and the junctions shall be sealed.

4.4.3 Transport packing is intended to protect the machine against mechanical damage that might occur during handling, transportation and storage.

4.4.3.1 Transport packing used by the manufacturer shall be in compliance with International Standards or other documents stipulated in the order or contract of sale.

4.4.3.2 A machine can be shipped without any packing or only with partial packing of vital parts, provided such a packaging does not cause damage to or detract from the external appearance of the machine.

5 Storage and transportation

5.1 Storage and transportation conditions

5.1.1 Four categories of severity for storage and transportation, depending on the nature of corrosive agents in the atmosphere and on storing conditions, are recognized. The categories are :

A — light duty,

B — medium duty,

C — heavy duty, and

D — very heavy duty.

The category of storage and transportation conditions shall be specified by the user (see 5.1.3, 5.1.4, and 5.1.5).

5.1.2 Storage is classified as short-term and long-term.

5.1.2.1 Short-term storage covers periods up to two months. In short-term storage, the machine shall be held ready for immediate use.

5.1.2.2 Long-term storage covers periods exceeding two months. Long-term storage is classified as

a) for periods up to one year,

b) for periods exceeding one year.

5.1.3 For machines in short-term storage, the normal category is A (see 5.1.1), but under very severe corrosive conditions a higher category may be necessary.

5.1.4 The categories of long-term storage conditions are listed in table 2.

5.1.5 The categories of transportation conditions are listed in table 3.

5.1.6 The categories of storage and transportation for dismantled elements shall be the same as the categories of storage and transportation of the base machine.

5.2 Storage sites and conditions

5.2.1 Machines may be stored under cover, in the open air in transport packing, in closed unheated or air-conditioned premises, or under any other storage site conditions equivalent to or better than those recommended by the manufacturer.

5.2.2 Prior to putting into long-term storage, the machine shall be inspected and the condition of preservation treatment, seals, and components shall be checked.

5.2.3 The machine shall be set horizontally on supports to prevent warping of the frame or deformation of pneumatic wheels. The clearance between the wheels and the supporting surface shall be not less than 8 cm.

5.2.4 Access openings, fuel filler openings, exhaust pipes and other openings through which atmospheric precipitations may penetrate into the inner cavities of component units and parts, shall be tightly closed with caps, plugs, water-resistant adhesive tape or other special devices.

5.2.5 Control levers and pedals shall be set in such positions where there is no danger of the machine being set in operation accidentally.

5.2.6 Storage batteries shall be disconnected. The level and density of electrolyte shall be in accordance with the recommendations of the manufacturer. When the machine is put into storage for more than one month, storage batteries shall be removed from the machine and put into storage in special premises.

5.2.7 Fuel, lubricants, hydraulic fluids, coolants and water in tanks shall be filled to the levels recommended by the manufacturer or the national governing body having jurisdiction.

5.2.8 A machine in long-term storage shall be regularly inspected for its external appearance, the condition of preserved surfaces, and the preservatives.

Preferred inspection intervals for long-term storage are as follows :

— in temperate climatic conditions : every 6 months;

— in tropical, cold, arctic and coastal climatic conditions : every 3 months.