

INTERNATIONAL STANDARD

ISO
12374

First edition
1995-07-15

ANSI Internat Doc Sec

Agricultural irrigation — Wiring and equipment for electrically driven or controlled irrigation machines

*Irrigation agricole — Câblage et matériel pour les machines d'irrigation
entraînées ou commandées électriquement*



Reference number
ISO 12374:1995(E)



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Foreword

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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.

International Standard ISO 12374 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 18, *Irrigation and drainage equipment and systems*.

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International Organization for Standardization

Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Agricultural irrigation — Wiring and equipment for electrically driven or controlled irrigation machines

1 Scope

This International Standard provides detailed information for the application of electrical apparatus to electrically driven or controlled agricultural irrigation machines, covering all electrical equipment, apparatus, components and wiring necessary from the point of connection of electric power to the machine. It applies to electrical equipment for use on circuits operating at voltages from 30 V to 600 V.

The purpose of this International Standard is to improve the degree of personal safety in operation and application of products and materials under a reasonable range of conditions.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 11684:1995, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Safety signs and hazard pictorials — General principles*.

IEC 173:1964, *Colours of the cores of flexible cables and cords*.

IEC 228:1978, *Conductors of insulated cables*.

IEC 529:1989, *Degrees of protection provided by enclosures (IP Code)*.

3 Definitions

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

3.1 ampacity: Allowable current-carrying capacity of a conductor determined by the conductor diameter and the insulation on the conductor.

NOTE 1 The conductors can carry more than the allowable current; however, the allowable current is set to prevent overheating and damage to insulation or equipment.

3.2 auxiliary conductor: Conductor that carries current to a device which is not necessary for movement of the machine.

3.3 auxiliary panel: Enclosure containing auxiliary control devices for the machine such as motor controllers, relays, switches and transformers, but not including the main controller and other main control devices that supply power to the entire machine.

NOTE 2 A junction box is not an auxiliary panel.

3.4 bonded connection: Reliable connection to ensure the necessary electrical conductivity between metal parts required to be electrically connected.

3.5 collector ring: Assembly of slip rings for transferring electrical energy from a stationary conductor to a rotating conductor.

3.6 control conductor: Conductor that carries current to a control device that is necessary for movement of the machine.

3.7 front-mounted device: Replaceable device mounted so that it may be individually replaced from the front of an enclosure without removing subpanels,

other devices or rear enclosure covers to gain access to hidden fasteners.

3.8 front-wired device: Replaceable device mounted so that it may be individually wired from the front of an enclosure without removing the device, subpanels or rear enclosure covers to gain access to electrical connections.

3.9 grounded: Connected to earth or to some conducting body which serves in place of earth.

3.10 grounded conductor: Conductor in a circuit which is intentionally grounded.

3.11 grounding conductor: Conductor used to connect non-current-carrying metal parts of a machine to a service-grounded conductor and/or a grounding-electrode conductor.

3.12 (irrigation) machine: Electrically driven or controlled machine, not portable by hand, used primarily to transport and distribute water for agricultural purposes.

3.13 machine isolator: Disconnecting means at the point of connection of electrical power to the machine.

3.14 main control panel: Enclosure containing the main controller and other control devices necessary for starting and stopping the machine.

3.15 metal-to-metal connection: Attachment of metal parts to the machine with bolts and screws to provide an adequate contact for bonding purposes where all paint and dirt have been removed from under the bearing surface area of bolt or screw heads.

3.16 nonwicking filler: Filler material within an electrical cable which has high resistance to moisture migration from one location to another within the cable.

3.17 power conductor: Conductor that carries current to provide electrical power from the machine isolator to a drive motor.

3.18 raceway: Enclosed channel designed expressly for holding electrical wires, cables or busbars.

3.19 readily accessible: Capable of being opened quickly for maintenance, repair or inspection.

NOTE 3 The object may be fastened by latches or held by mechanical interlocks or similar apparatus. A cover firmly attached by two or more screws is not considered readily accessible.

3.20 weatherproof: Constructed or protected so that exposure to the environment does not interfere with successful operation.

4 General requirements

4.1 Means of isolation

A mechanism to provide overcurrent protection to a machine with the capacity to lock the machine in the OFF position shall be provided at the point of connection of electrical power to the machine.

4.2 Enclosures

4.2.1 All enclosures shall have a degree of protection of IP 33 as specified in IEC 529.

4.2.2 Entrances into, exits from, and penetrations of the enclosure shall be made such as to reduce the possibility of the collection of water or contaminants at the point of connection and to preserve the rating of the enclosure specified in 4.2.1.

4.2.3 Dimensions of enclosures shall not be less than the maximum dimensions of the enclosed equipment plus the required electrical clearances which conform to the requirements in IEC 529.

4.2.4 Where used, gaskets shall be securely attached to one of the mating parts.

4.2.5 Enclosures should be mounted such as to minimize the possibility of subsequent physical damage to the enclosure.

4.3 Interlocking

Where personal hazard or property damage may be caused by the failure of any device to function properly, protective interlocks shall be provided. Where practicable, these interlocks shall interrupt all operations, providing such interruption does not create a hazardous condition.

4.4 Automatic or remote starting

4.4.1 Automatic restarting shall be connected so that restarting occurs only on resumption of full single-phase or three-phase power, as needed, following a power cut or upon resumption of fluid pressure.

Automatic restarting shall not be construed as encompassing the functions of a device or circuit de-