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Powered lawn, garden and horticultural equipment — Operator controls — Guidance on actuating forces, displacement, location and methods of operation

Matériel à moteur pour jardins, pelouses et pour l'horticulture — Commandes de l'opérateur — Lignes directrices pour les forces d'actionnement, déplacements, emplacements et méthodes de fonctionnement

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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 preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. 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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

— an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;

— an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed every three years with a view to deciding whether it can be transformed into an International Standard.

Attention is drawn to the possibility that some of the elements of ISO/TS 15079 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TS 15079 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 13, *Powered lawn and garden equipment*.

This first edition of ISO/TS 15079 replaces ISO 3789-3:1989, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Location and method of operation of operator controls — Part 3: Controls for powered lawn and garden equipment*, which has been technically revised.

Introduction

This Technical Specification gives guidance on the design of operator controls (herein called “controls”) with respect to their method of operation, actuating force, displacement and location. The controls are those located at the operator’s normal working position, readily accessible and conveniently placed for the operator. The provisions contained in this Technical Specification were derived from experience, current practice, ergonomic literature and existing standards.

Generalized control data pertaining to control-actuation forces, displacement and location found in a number of ergonomic texts and references are not in total agreement. The myriad of variables affecting control design indicates that these control parameters are interactive and that no single value is correct for a given control design. Control method of operation has been standardized for a number of years and the operational methods contained in this Technical Specification are consistent with the International Standard it replaces as well as other standards relating to controls.

Control design involves complex issues and is influenced by control size, actuation, direction, displacement, and the relationship with, or proximity to, other controls and the operator. Operator capabilities are also influenced by many factors, including body position and control location or displacement direction relative to the operator. The unique situation in which, and the purpose for which, a control device is to be used can materially affect the appropriateness of a given type of control and can justify (or virtually require) variations from a set of general recommendations or practice based on research or experience. It is therefore imperative that tests involving multiple operators be performed as a prerequisite to final judgement of a machine control design essential to the correct operation of that machine.

Control shape, size, texture, proximity, clearance and markings are essential elements of good control design. However, these control elements are not included in this Technical Specification. For additional information concerning these subjects, the reader should consult an ergonomic reference or references.

It is generally desirable to design a machine and its controls for the 5th to 95th percentile operator. In some cases, compromise is essential for meeting the multitude of objectives involved in the design of a machine. By testing a control system with multiple operators, final judgement can be made on controls involved in such compromises.

Powered lawn, garden and horticulture equipment — Operator controls — Guidance on actuating forces, displacement, location and methods of operation

1 Scope

This Technical Specification gives guidance on actuating forces for hand and foot controls on powered lawn, garden and horticulture equipment, and their displacement, preferred location and method of operation. It is applicable to operator controls on both ride-on machines and pedestrian-controlled machines. Handheld products are not covered.

This Technical Specification is not applicable to passive controls (e.g. seat-activated, operator-presence controls utilized on ride-on machines). It contains data applicable to frequently used controls that require intentional operator actuation for control function. Infrequently used control forces and displacements may exceed the magnitudes given in this Technical Specification.

NOTE The concept of frequently used controls is relative to a given machine type and its use or requirements.

2 Terms and definitions

For the purposes of this Technical Specification, the following terms and definitions apply.

2.1
control actuating force
force exerted on the control to effect a response

2.2
control displacement
movement of a control through its operational range

2.3
forward
direction in which the operator faces when in the normal operator's position as specified by the manufacturer

2.4
operator control
any device actuated by the operator without use of tools to effect a response of the machine

2.5
operator presence control
operator control that automatically interrupts power to a drive when the actuating force is removed

2.6
operator position
operator location required for safe operation and control of the machine

2.7
pedestrian-controlled machine
a ground-supported machine controlled by an operator walking behind or standing on the back of the machine

2.8
ride-on machine
a self-propelled machine controlled by an operator sitting on the machine

3 Control parameters

The controls for which provisions are given in this Technical Specification are not required on all machines, but when provided on a machine they should conform to its recommendations. Control requirements given in specific product standards shall take precedence over those given in this Technical Specification.

The location and means of operation of control types are indicated in clause 5 for ride-on machines, and clause 6 for pedestrian-controlled machines. The maximum actuating force and the displacement of controls are given in clause 7. Minimum values should be accessed for specific machine designs.

Clause 7 should be used as a starting point for control design. Maximum force magnitude and displacement should not be used on a given control. In addition, actual values may differ due to the

— users for which the machine is intended (e.g. women or seniors),

— frequency of use of the control,

— control location and displacement relative to the user,

— size of the control, and

— professional use of the machine.

Multifunction controls should follow the principles listed.

4 Control actuating force and displacement — Measurement

The measurement of a control actuating force is made through the entire displacement and from the centre of that part of the control designed to be actuated by the operator. The direction of the force measurement is perpendicular to the control surface designed to be actuated by the operator and in the direction of movement of the surface. The direction of movement for rotary controls may be clockwise or counterclockwise; the effort to move the control is measured as torque.

NOTE This measured force does not necessarily represent the force normally applied by the operator.

Control displacement measurement is made in a manner similar to the above-described force measurement method. Displacements listed in clause 7 in terms of linear dimensions are measured in a straight line.

5 Control location and method of operation — Ride-on machines

Type		Location	Operation
5.1	**Engine**		
5.1.1	**Starting**		
5.1.1.1	**Ignition switch (if separate from starter switch)**		Can be rotary, toggle, or rocker type. If rotary type, should rotate clockwise to “on” position. If toggle type, should move forward and/or upward to “on” position. If rocker type, the upper portion or position farthest away from the operator should be pushed to “on” position.

Type		Location	Operation
5.1.1.2	**Starter switch or starter means (if separate from ignition switch)**		Can be push or key type. If key type, should rotate clockwise to “start” position. All types should return to “off” position when released.
5.1.1.3	**Ignition/starter switch**		Switch should be rotated in a clockwise direction to “start” position with return to “run” position when released. If an engine preheater circuit is provided, this function should occur before or on the starting position but may be activated by rotating the control counterclockwise.
5.1.1.4	**Start by manual means**		Can be pull, kick or crank. Requires manual and intentional actuation without using a removable part and with return to its original position.
5.1.2	**Speed**		
5.1.2.1	**Foot-operated**	Should be readily accessible to the operator’s right foot and to the right or below and backwards of the brake pedal	Pedal should be pushed forward and/or downward to increase engine speed.
5.1.2.2	**Hand-operated**	Should be easily accessible to the operator	
5.1.2.2.1	**Lever**		Direction of motion should be in a plane generally parallel to the longitudinal axis of the machine. The direction of motion should be away from the operator (generally forward), and/or upward to increase engine speed.
5.1.2.2.2	**Twist grip**	Should be easily accessible to the operator’s right hand	The speed should increase when the top of the grip is rotated towards the operator.
5.1.3	**Stopping**		
5.1.3.1	**Battery start**	Should be easily accessible from the operator’s position	Can be rotary, toggle or rocker type. If rotary type, should rotate counterclockwise to “off” position. If toggle type, should move rearward and/or down to “off” position. Control should automatically remain in the stop position without the application of sustained manual effort. If stop control is combined with the speed control, it should be in the direction of, and beyond, the idle position.
5.1.3.2	**Manual means**	Should be easily accessible from the operator’s position	This is a means that does not depend on sustained manual force. If stop control is combined with the speed control, it should be in the direction of, and beyond, the idle position.

Type		Location	Operation
5.2	**Electric motor**		
5.2.1	**Starting**		
	Motor on-switch		Can be rotary, toggle, or rocker type. If rotary type, should rotate clockwise to “on” position. If toggle type, should move forward and/or upward to “on” position.
5.2.2	**Speed**		
5.2.2.1	**Foot-operated**	Should be readily accessible to the operator’s right foot and to the right or below and backwards of the brake pedal	Pedal should be pushed forward and/or downward to increase engine speed.
5.2.2.2	**Hand-operated**	Should be easily accessible to the operator	
5.2.2.3	**Lever**		Direction of motion should be in a plane generally parallel to the longitudinal axis of the machine. The direction of motion should be generally forward or upward to increase engine speed.
5.2.2.4	**Twist grip**	Should be easily accessible to the operator’s right hand	The speed should increase when the top of the grip is rotated towards the operator.
5.2.3	**Stop**		
	Motor stop-switch		Can be rotary, toggle or rocker type. If rotary type, should rotate counterclockwise the “off” position. If toggle type, should move rearward and/or down to “off” position. Control should automatically remain in the stop position without the application of sustained manual effort. If stop control is combined with the speed control, it should be in the direction of, and beyond, the slow speed position.
5.3	**Steering**		
5.3.1	**Hand-operated**	Should be convenient to the operator	The steering mechanism should not lock while in operation.
5.3.1.1	**Wheel/ handlebar**	Should be forward of the operator and aligned approximately with the centreline of the operator seat	A clockwise rotation should effect a right turn, and a counter-clockwise rotation should effect a left turn.
5.3.1.2	**Two levers**	Should be forward or to the sides of the operator. If to the sides of the operator, one lever should be on the left and one lever should be on the right.	The machine should turn right when the left lever is displaced further in the direction of the machine travel than the right lever. The machine should turn left when the right lever is displaced further in the direction of machine travel than the left lever.