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Indian Standard

GUIDELINES FOR LOCATION AND OPERATION OF OPERATOR CONTROLS ON AGRICULTURAL TRACTORS AND MACHINERY

(First Revision)

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GUIDELINES FOR LOCATION AND OPERATION OF OPERATOR CONTROLS ON AGRICULTURAL TRACTORS AND MACHINERY

(First Revision)

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Indian Standard

GUIDELINES FOR LOCATION AND OPERATION OF OPERATOR CONTROLS ON AGRICULTURAL TRACTORS AND MACHINERY

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 30 November 1983, after the draft finalized by the Agricultural Tractors and Power Tillers Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 Agricultural tractors and other farm machinery are being extensively manufactured and used in the country. This standard was first published in 1976. A need was felt to revise this standard to align it with the corresponding ISO standard. Actuating forces required to operate various controls, which were covered earlier in the standard, have been deleted from this revised version and a separate standard IS : 10703-1983* has been published on this subject.

0.3 In the preparation of this standard, assistance has been derived from the following:

ISO 3789/1-1982 Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Location and method of operation of operator controls — Part 1 Common controls. International Organization for Standardization.

ISO 3789/2-1982 Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Location and method of operation of operator controls — Part 2 Controls for agricultural tractors and machinery. International Organization for Standardization.

*Symbols for operator controls on agricultural tractors and farm machinery.

1. SCOPE

1.1 This standard covers location and method of operation operator controls on agricultural tractors and other machinery.

2. GENERAL

2.1 Symbols for different controls shall be as given in IS : 6283-1971*.

3. LOCATION AND OPERATION OF CONTROLS

3.1 The location and operation of controls for agricultural tractors and self-propelled machines are laid down in Table 1.

3.2 The location and operation of controls for pedestrian-operated machines are laid down in Table 2.

*Symbols for operator controls on agricultural tractors and farm machinery.

TABLE 1 LOCATION AND OPERATION OF CONTROLS ON AGRICULTURAL TRACTORS AND SELF-PROPELLED MACHINES

(*Clauses* 3.1)

Sl No.	Control	Location	Operation
(1)	(2)	(3)	(4)
i)	Engine		
	a) Starting		Preferably, it should not be possible to start the engine unless : a) the traction transmission is in neutral or park position or b) the traction clutch is disengaged or c) the operator is in the operator's seat (station)
	1) Ignition switch (if separate from starter switch)	Easily accessible from the operator's seat	Move control to ' on ' position
	2) Starter switch (if separate from ignition switch)	do	Move control to start position
	3) Starter/ignition switch (spark ignition)	do	Rotate switch in clockwise direction to positive ingnition position. Any auxiliary positions provided shall be located between the ' off ' and ignition positions
	4) Starter switch (compression ignition)	do	Move control to start position. If a rotational switch is provided, rotate clockwise to operate engine starter. If an engine pre-heater circuit is provided, this control shall occur before the start-position or may be activated by rotating the control anti-clockwise. If pull switch is provided, pull out

(*Continued*)

TABLE 1 LOCATION AND OPERATION OF CONTROLS ON AGRICULTURAL TRACTORS AND SELF-PROPELLED MACHINES — *Contd*

Sl No.	Control	Location	Operation
(1)	(2)	(3)	(4)
	b) Speed		
	1) Foot-operated	Readily accessible to the operator's right foot and preferably to the right of the brake pedal(s)	Push pedal forward and/or downward to increase engine speed
	2) Hand-operated	Within easy reach and preferably in front of, or to the right side of the operator	The direction of motion of the control shall be towards the operator (generally rearward or downward) for increasing the engine speed
	c) Stop		
	1) Spark ignition	Easily accessible from the operator's seat	Rotate starter ignition switch anti-clockwise to 'off' (open circuit) position. In case of pull type, push the device
	2) Compression ignition	Easily accessible from the operator's seat. Colour of the control or the position 'stop' shall contrast with background and any other control	Move control to stop position. Control shall automatically remain in the stop position without the application of sustained manual effort
ii)	Steering	Forward of the operator	When a steering wheel control is provided, a clockwise rotation shall effect a right turn and an anti-clockwise rotation shall effect a left turn When two levers are provided for steering, to achieve a right turn the right-hand lever shall move rearward and for a left turn the left-hand lever shall move rearward

		When one lever is provided for steering, a lateral motion of the lever to the right shall effect a right turn and a lateral motion to the left shall effect a left turn
iii) Brakes		
a) Service brake		
1) Foot-operated	The brake pedal(s) shall be located convenient to the operator's right foot	The direction of motion shall be generally forward and/or downward for engagement. Where separate brake pedals are provided on wheeled tractors for the independent right-hand and left-hand brake control, it shall be possible to obtain combined control so that there is no undue deviation from a straight path of travel
2) Hand-operated	Convenient to the operator	Application of pull motion is preferred. Where means are provided for independent right-hand and left-hand operation, it shall be possible to obtain combined control so that there is no undue deviation from a straight path of travel
b) Parking brake		
1) Hand-operated	do	Application of pull motion is preferred. A device shall be provided to retain brake(s) in the applied position. The device shall not be liable to accidental release
2) Foot-operated	do	Depress brake pedal and lock in position
c) Braking of trailors or towed equipment		
1) Foot-operated	Combined with the pedal(s) of service brake	Apply pull motion
2) Hand-operated	Separate right-hand lever	Apply pull motion

(*Continued*)

TABLE 1 LOCATION AND OPERATION OF CONTROLS ON AGRICULTURAL TRACTORS AND SELF-PROPELLED MACHINES — *Contd*

Sl No.	Control	Location	Operation
(1)	(2)	(3)	(4)
iv)	Transmission		
	a) Clutch (includes combined transmission and power take-off) (*see also* power take-off control)		
	1) Foot-operated	Convenient to the operator's left foot	Push pedal forward or downward for disengagement
	2) Hand-operated	Within convenient reach of the operator	Move rearward for disengagement. Positive means shall be provided for holding the clutch control in the disengaged position so that it is incapable of being re-engaged unless manually operated. It is recommended that the clutch be operable only from the operator's seat
	b) Combination ground seed and direction (continuously variable combine control)		
	1) Foot-operated (one control or two controls)	Convenient to the operator's right foot	The control shall have the effect of a pedal being pivoted under the operator's foot and shall remain at rest in the neutral position. Forward and/or downward motion of the front of the pedal shall cause forward motion and increasing forward speed; downward motion of the rear of the pedal shall cause reverse motion and increasing reverse speed.

		Where the control can pass directly from forward to reverse through the netural position, provision shall be made for a secondary motion. A positive ' neutral ' location shall be provided.
2) Hand-operated	Convenient to the operator	Move control from neutral position forwards and/or upwards for forward motion and increasing forward speed; rearwards and/or downwards for reverse motion and increasing reverse speed. Where the selection control can pass directly from forward to reverse through the neutral position, provision shall be made for a secondary motion. A positive ' neutral ' location shall be provided.
c) Gear selection		
1) In-line operation (hand-operated)	do	From neutral position, move control progressively in an upward and/or forward direction to select gears giving increased forward speeds. From neutral position, move control progressively in a rearward and/or downward direction to select reverse gears giving increased reverse speeds. Where the selection control can pass directly from forward to reverse through the neutral position, a separate positive ' neutral ' location shall be provided. Provision shall be made for secondary motion when passing through neutral so as to prevent accidental movement of the control
2) Non-in-line operation (hand-operated)	do	Shifting pattern shall be simple and clearly marked. In particular, the netural position shall be clearly identified and easy to select

(*Continued*)

TABLE 1 LOCATION AND OPERATION OF CONTROLS ON AGRICULTURAL TRACTORS AND SELF-PROPELLED MACHINES — *Contd*

Sl No.	Control	Location	Operation
(1)	(2)	(3)	(4)
	d) Direction control (forward-reverse non-variable speed) (hand operated)	Convenient to the operator	Move control generally forward for forward vehicle motion and move generally rearward for rearward vehicle motion. If a neutral position is provided, provision shall be made to prevent accidental movement of the control from neutral
	e) Master implement, header or gathering unit clutch (self-propelled machines)		
	1) Hand-operated	do	Movement shall be generally rearward and/or downward for disengagement. Positive means shall be provided for holding the clutch control in the disengaged position so that it is incapable of being re-engaged unless manually operated. The clutch shall be operable only from the operator's seat
	2) Foot-operated	Preferably convenient to the operator's left foot	Push pedal forward or downward for disengagement
	v) Differential lock	Preferably convenient to the operator's right foot or right hand	Move forward or downward for engagement. There shall be clear indication when differential lock is engaged

vi) Power take-off		
a) Clutch		
1) Foot-operated	Convenient to the operator's left foot	Push pedal forward and/or downward for disengagement. In the case of a combined traction-drive/power take-off clutch, the power take-off disengagement shall be at second stage
2) Hand-operated	Convenient to the operator	Move control downward and/or rearward to disengage. Control should be operable only with the operator in the opertor's station
b) Power take-off shaft engagement	Convenient to the operator	The disengaged position shall be clearly marked and visible from the operator's seat. Control shall be operable only with the operator in the operator's station
vii) Implements and auxiliaries		
a) Lift mechanism		
1) Hand-operated	Convenient to the operator's right hand	Move levers upward and/or rearward to raise; downward and/or forward to lower. It shall be possible to lock the control lever(s) or mechanism in position during road transport and servicing or adjusting of implements in the raised position unless other means are provided
2) Foot-operated	Convenient to the operator's right foot	Downward movement of the forward part of the pedal to lower and downward movement of the rear part to raise
b) Services selector(s)		
1) Hydraulic	Optional, but readily visible from the operator's normal position	Clearly marked to identify function in each position
2) Electric	Optional	do

TABLE 2 LOCATION AND OPERATION OF CONTROLS ON PEDESTRIAN-OPERATED MACHINES

(*Clause* 3.2)

Sl No.	Control	Location	Operation
(1)	(2)	(3)	(4)
i)	Engine		
	a) Starting		It shall not be possible to start the engine unless : a) the traction transmission is in neutral or park position or b) the traction clutch is disengaged
	1) Starter/ignition switch (spark ignition)	Should be so located that it can be operated only from the normal operating position	Rotate switch in a clockwise direction to positive ignition position
	2) Starter switch (compression ignition)	Should be so located that it can be operated only from the normal operating position	Move control to start position. If a rotational switch is provided, rotate clockwise to operate engine starter. This start position shall always be the final position. If an engine, pre-heater circuit is provided in this shall occur immediately before the start position
	3) Recoil type	Recoil starter handle should be so located that it cannot be operated from the front of the machine	Pull grip
	4) Inertia type	Should not be operable from the front of the machine	Wind handle and release control. It shall be impossible to release the inertia mechanism unless:

		a) the traction transmission is in neutral or park position or b) the traction clutch is disengaged
b) Speed (hand-operated)		
1) Lever	Accessible to the operator's right hand when at normal operating position	The direction of motion of the control shall be in a plane parallel to the longitudinal axis of travel of the vehicle. The direction of motion shall be forward and/or upward for increasing engine speed
2) Turning handle	Accessible to the operator's right hand	Anti-clockwise to accelerate
c) Stop		
1) Spark ignition	Control to be forward and within easy reach of the operator in the operator's position. Colour of the control to contrast with background and any other control	Rotate starter ignition switch anti-clockwise to 'off' (open circuit) position. With pull switch, pull out and with stop button, press button
2) Compression ignition	Control to be forward and within easy reach of the operator in the operator's position. Colour of the control to contrast with background and any other control	Move control to stop position. Control shall remain in the stop position without the application of sustained manual effort
ii) Traction-drive		
a) Clutch		
1) Hand-operated [main transmission excluding (2) below]	Preferably convenient to the operator's left hand	Move rearward or upward for disengagement. Positive means shall be provided for holding the clutch control in the disengaged position so that it is incapable of being re-engaged, unless manualy operated

(*Continued*)

TABLE 2 LOCATION AND OPERATION OF CONTROLS ON PEDESTRIAN-OPERATED MACHINES — *Contd*

Sl No.	Control	Location	Operation
(1)	(2)	(3)	(4)
	2) Hand-operated (main transmission of the type requiring sustained manual effort)	Preferably convenient to the operator's left hand	Move control forward or downward to engage clutch
	b) Gear selection	As near to the centre line of the machine as possible and within easy reach of the operator, and clearly visible to the operator while in the operator's zone	Shifting pattern should be simple and clearly marked. In particular, the neutral position shall be clearly identified and easy to select. When a reverse gear is fitted, it shall only engage as a result of the operator applying sustained manual pressure to the control
iii)	Auxiliary machine elements clutch	Convenient to the operator's left hand but mounted to the right of the main transmission clutch control	Move rearward for disengagement. Positive means should be provided for holding the control in the disengaged position so that it is incapable of being re-engaged unless manually operated
iv)	Element adjustment		
	a) Screw-operated	Optional	Clockwise rotation should move the components affected upward, rearward or to the right
	b) Lever-operated	do	For moving components in any plane, the lever should move in the same general direction as the components

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m²
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemen	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m²

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AMENDMENT NO. 1 AUGUST 1995
TO
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(First Revision)

(*Page* 4, *clause* 1.1) — Substitute the following for the existing clause:

'1.1 This standard provides guidelines for location and method of operation of controls on agricultural tractors and other machinery.'

[*Page* 7, *Table* 1, *Sl No.* (iii)(c)(1), *col* 4] — Substitute 'Push Pedal forward or downward for engagement' *for* 'Apply pull motion'.

(FAD 32)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 2 NOVEMBER 2000
TO
IS 8133 : 1983 GUIDELINES FOR LOCATION AND OPERATION OF OPERATOR CONTROLS ON AGRICULTURAL TRACTORS AND MACHINERY

(First Revision)

[*Page* 6, *Table* 1, *Sl No.* 1(b) (2), *col* 4)] — Substitute the following for the existing:

'The direction of motion of the control shall be as indicated by the manufacturer.'

(FAD 32)

Reprography Unit, BIS, New Delhi, India