SAE International™ SURFACE VEHICLE STANDARD

SAE J154

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Operator Space Envelope Dimensions for Off-Road Machines

1. ***Scope***—This SAE Standard defines the minimum normal operating space envelope for clothed seated (SAE J899 seat configuration) and standing operators (95th percentile operator, SAE J833).

This document applies to off-road, self-propelled work machines used in construction, general purpose industrial, agricultural, and forestry as identified in SAE J1116.

1.1 **Purpose**—This document defines dimensions for the minimum normal operating space envelope around the operator for operator enclosures (cabs, ROPS, FOPS) on off-road machines.

2. ***References***

2.1 **Applicable Publications**—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J833 MAY89—Human Physical Dimensions
SAE J899 DEC88—Control Locations for Off-Road Work Machines
SAE J1116 JUN86—Categories of Off-Road Self-Propelled Work Machines
SAE J1163 JUN91—Determining Seat Index Point

2.1.2 ISO PUBLICATIONS—Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002.

ISO 3411-1982—Earth-moving machinery—Human physical dimensions of operators and minimum operator space envelope
ISO 4252-1983—Agricultural tractors—Access, exit and the operator's workplace—Dimensions

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3. Operator Space Envelope Dimensions

3.1 The dimensions for the recommended minimum normal operating space envelope around a clothed operator are defined for a seated operator in Figure 1 and for a standing operator in Figure 2. Potential adjustments to the minimum operator space envelope for particular machine applications and constraints are outlined in 3.3.

3.2 The minimum operator space envelope is measured to the interior surface without visible surface deformation of the operator enclosure.

3.3 The operator enclosure minimum space envelope may be smaller than specified in Figures 1 and 2 if it can be demonstrated that the reduced operator space envelope for a particular machine application allows for adequate operator performance. Potential modifications for the operator enclosure space envelope include, but are not limited to:

3.3.1 An operator enclosure minimum height of 1050 mm from the SIP is recommended to accommodate commonly used suspension seats and to provide clearance for an operator's hard hat. The operator enclosure minimum height can be reduced to 1000 mm for machines used predominantly in applications in which the operator normally does not wear a hard hat.

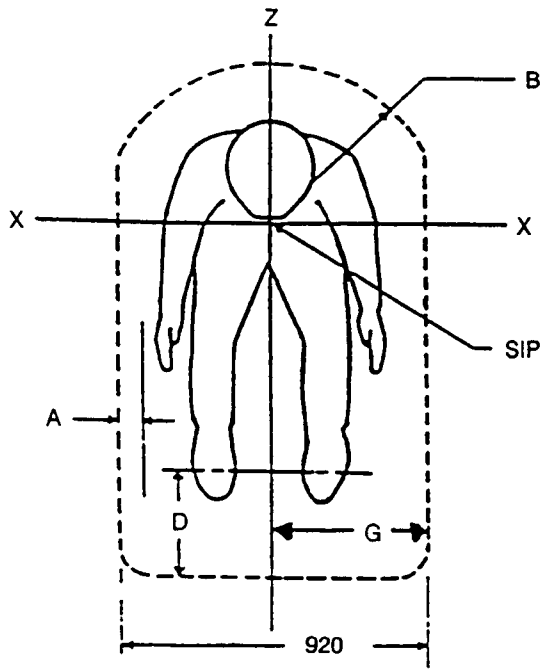
The enclosure height can also be adjusted for the following variations in seat configurations:

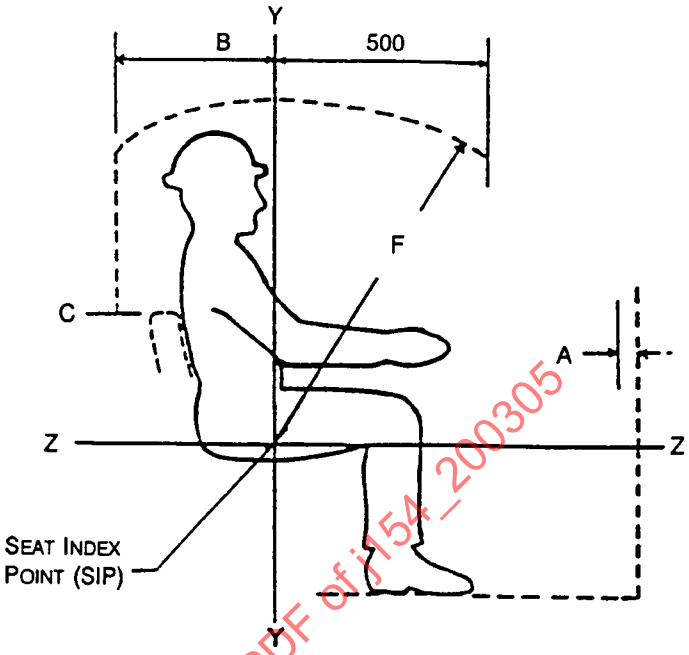
a. 40 mm reduction without vertical seat suspension
b. 40 mm reduction without vertical seat height adjustment
c. Adjustment for seat back rest angle greater than 15 degrees

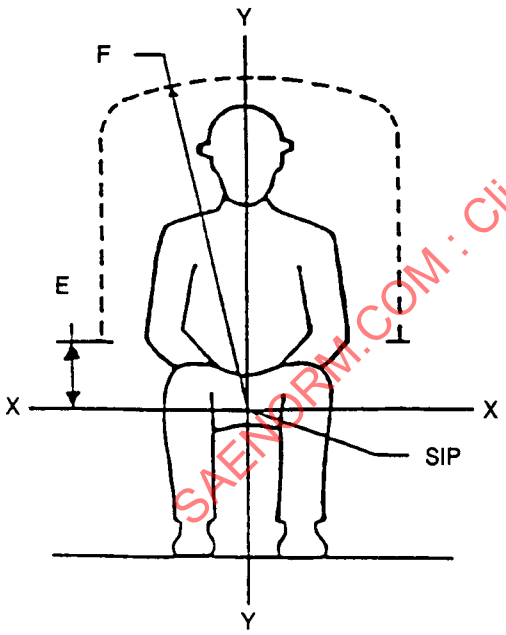
3.3.2 The operator may be offset from the space envelope width centerline to allow direct visibility to the side of the machine, provided the minimum internal distance from the SIP to the side of the enclosure is at least 335 mm.

3.3.3 Some particular types of machines may necessitate use of an operator space envelope smaller than the minimum recommended by this document. For these machines, the internal operator space envelope width may be reduced to a minimum of 670 mm to accommodate a 95th percentile operator with heavy clothing. If machine width constraints necessitate a space envelope width less than 670 mm, the space envelope may not accommodate a 95th percentile operator with heavy clothing and the operator should be alerted that the machine may not accommodate large operators. All operators should check the space envelope width before operating the machine to insure that it is adequate.

3.3.4 When rearward visibility or access to a control to the rear of the SIP is required, the minimum clearance to the rear of the operator enclosure can be reduced to 200 mm plus one half the fore-aft seat adjustment travel dimension.







X-X: Horizontal transverse axis through SIP
Y-Y: Vertical axis through SIP
Z-Z: Longitudinal axis through SIP

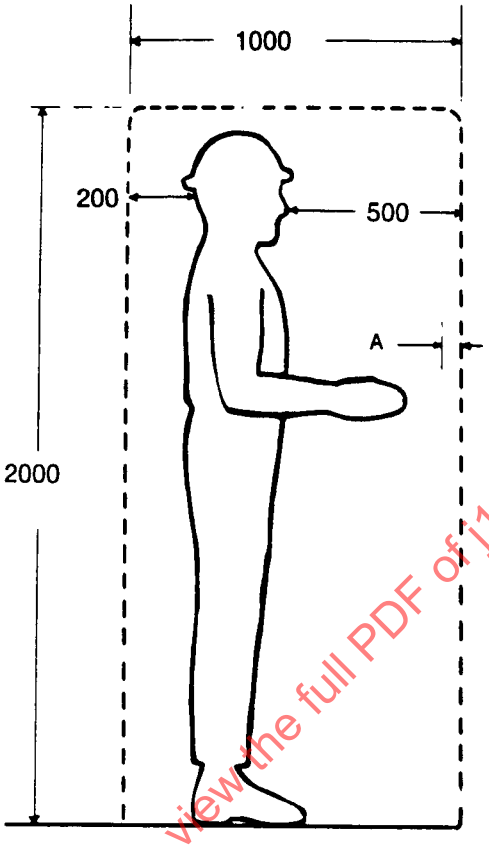
Minimum Operator Enclosure Dimensions

A = 50 mm clearance between enclosure and controls (add 25 mm for cold weather clothes).
B = 400 mm plus half of the horizontal seat adjustment dimension. See paragraph 3.3.4.
C = Terminus of rearward clearance is horizontal plane tangent to top of seat back.
D = 150 mm clearance from enclosure to centerline of the foot control. 400 mm clearance from heel rest for treadle pedals. 50 mm clearance between shoe and enclosure for suspended pedals.
E = Enclosure minimum width requirement terminates at a horizontal plane 150 mm above SIP or at contact with the undeflected top surface of the arm rest, if provided.
F = 1050 mm. See paragraphs 3.3.1.
G = 460 mm. See paragraphs 3.3.2 and 3.3.3.

Notes:

1. Dimensions (in mm) are minimum requirements.
2. Controls are positioned in closest proximity to enclosure when determining minimum control clearances.
3. Maximum radius at the intersection of enclosure's internal walls with each other and with enclosure ceiling is 250 mm.
4. Seat Index Point is considered equivalent to the H-Point as defined in SAE J1163.
5. Outline is not intended to imply the shape of the enclosure.
6. The minimum operator space envelope dimensions are referenced from the SIP even when the seat is offset or angled with respect to the enclosure centerline.

FIGURE 1—MINIMUM OPERATOR SPACE ENVELOPE DIMENSIONS FOR SITTING ENCLOSURE (95TH PERCENTILE OPERATOR, SEE SAE J833)



A—50 mm clearance between enclosure and controls (add 25 mm for cold weather clothes).

1. All notes for sit down enclosure (Figure 1) apply to standing enclosure.
2. Enclosure width dimension is same as sit down enclosure width (Figure 1).
3. Clearance between foot controls and standing enclosure is same as sit down enclosure clearance (Figure 1).

FIGURE 2—MINIMUM OPERATOR SPACE ENVELOPE DIMENSIONS FOR STANDING ENCLOSURE (95TH PERCENTILE OPERATOR, SEE SAE J833)

4. Notes

4.1 Key Words—Construction, Industrial, and Forestry Machines, Ag Tractors.

4.2 Marginal Indicia—The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

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