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Earth-moving machinery — Determination of average ground contact pressure for crawler machines

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The UK participation in its preparation was entrusted to Technical Committee B/513/1, Earth moving machinery (International).

A list of organizations represented on this committee can be obtained on request to its secretary.

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Earth-moving machinery — Determination of average ground contact pressure for crawler machines

Engins de terrassement — Détermination de la pression moyenne de contact au sol des engins à chenilles

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ISO 16754 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 1, *Test methods relating to machine performance*.

INTERNATIONAL STANDARD ISO 16754:2008(E)

Earth-moving machinery — Determination of average ground contact pressure for crawler machines

1 Scope

This International Standard specifies a uniform method for calculating the average ground contact pressure of self-propelled and towed crawler (track-laying) earth-moving machines, as defined in ISO 6165, on soft surfaces with empty equipment or attachment.

The average ground contact pressure value is used only for comparing different machine models. Actual ground contact pressure values under operating conditions will vary depending on load, position of the centre of gravity, terrain, track shoe type and size, and surface conditions.

NOTE 1 Alternative methods for determining ground contact pressure could apply to some specific machine families.

NOTE 2 The calculation makes allowance for some penetration into the supporting soil surface and the resulting increase in support area.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6165:2006, *Earth-moving machinery — Basic types — Identification and terms and definitions*

ISO 6746-1:2003, *Earth-moving machinery — Definitions of dimensions and codes — Part 1: Base machine*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6746-1 and the following apply.

3.1
operating mass
OM
mass of the base machine, with equipment and empty attachment in the most usual configuration as specified by the manufacturer, and with the operator (75 kg), full fuel tank and all fluid systems (i.e. hydraulic oil, transmission oil, engine oil, engine coolant) at the levels specified by the manufacturer and, when applicable, with sprinkler water tank(s) half-full

NOTE 1 The mass of an operator is not included for non-riding machines.

NOTE 2 Ballast mass included at delivery can be included if specified by the manufacturer.

NOTE 3 The operating mass is expressed in kilograms.

[ISO 6016]

3.2
overall crawler length
$L6$
distance on X coordinate between two X planes passing through the farthest points on the ground-supported portion of the track undercarriage

See Figure 1.

NOTE 1 It is expressed in millimetres.

NOTE 2 $L6$ can also be determined according to 4.3.

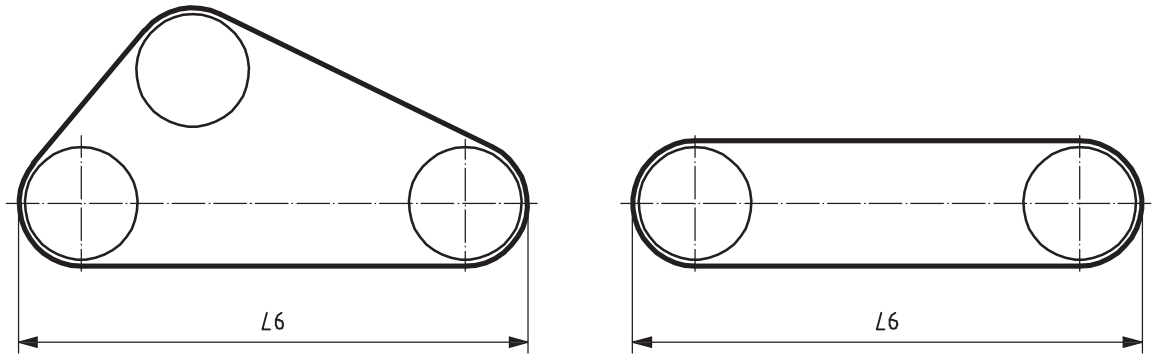


Figure 1 — Overall crawler length

3.3
crawler base
$L2$
distance on X coordinate between two X planes passing through the front idler axis and the sprocket (or rear idler) axis

[ISO 6746-1]

See Figure 2.

NOTE It is expressed in millimetres.

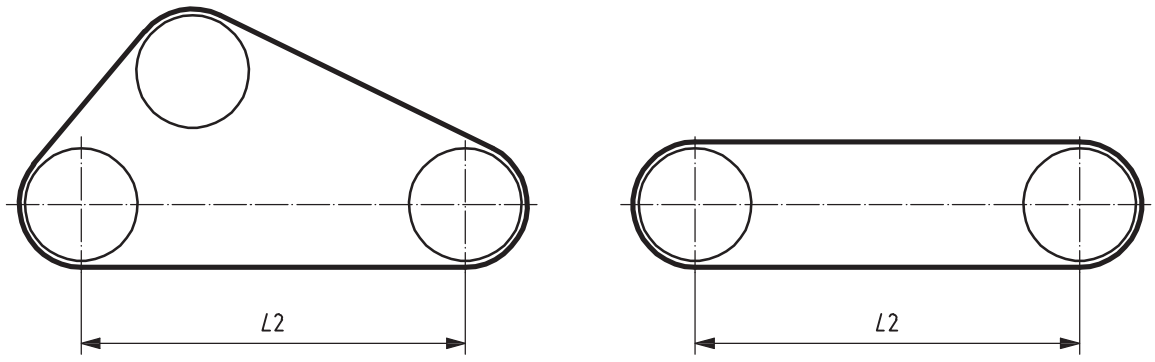


Figure 2 — Crawler base

3.4
track shoe width
$W4$
distance on Y coordinate between two Y planes passing through the extreme lateral points of the same track shoe

[ISO 6746-1]

See Figure 3.

NOTE It is expressed in millimetres.

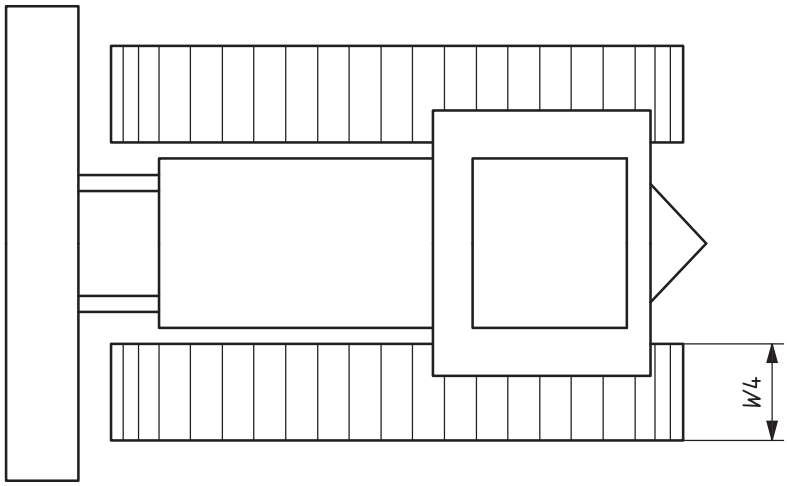


Figure 3 — Track shoe width

4 Requirements

4.1 General

The machine shall be the standard configuration as specified by the manufacturer.

4.2 Calculation of average ground contact pressure, P_g

Determine the average ground contact pressure, P_g, in kilopascals, using Equation (1):

$$P_g = \frac{1\,000 \times 9{,}807m}{n \times W_4\left[L_2 + 0{,}35(L_6 - L_2)\right]} \quad (1)$$

where

m is the operating mass;

n is the number of tracks;

L_2 is the crawler base;

L_6 is the overall crawler length;

W_4 is the track shoe width.

NOTE 1 Equation (1) provides allowance for some track penetration into the supporting soil surface and the resulting increase in support area.

NOTE 2 In the Equation (1), symbols with subscripts have been used to represent the dimensions in order to avoid confusion between codes (e.g. $L6$) and values.

4.3 Determination of $L6$

$L6$ can also be determined using Equation (2), which can be used for all types of crawler configurations, including that shown in Figure 4, provided that the angle, α, is greater than or equal to 10°.

$$L_6 = L_2 + 2d \tag{2}$$

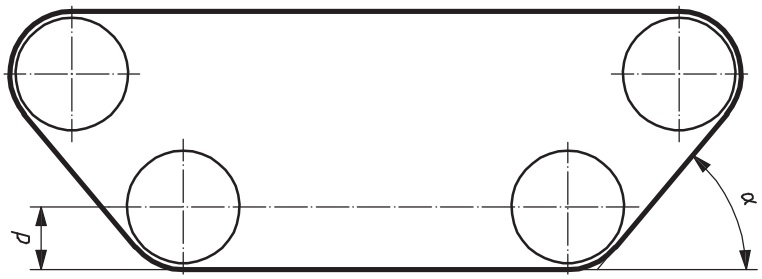
where

d is the distance on the Z coordinate between the ground reference plane and the Z plane (see ISO 6746-1) passing through the front and rear roller axis, as shown in Figure 4;

L_2 is the crawler base;

L_6 is the overall crawler length.

NOTE In the equation, symbols with subscripts have been used to represent the dimensions in order to avoid confusion between (e.g. $L6$) codes and values.



Angle α shall be $\geqslant$ 10°.

Figure 4 — Distance and angle used in determining $L6$

Bibliography

[1] ISO 6016, *Earth-moving machinery — Methods of measuring the masses of whole machines, their equipment and components*

[2] SAE J1309:2003, *Travel Performance and Rating Procedure, Crawler Mounted Hydraulic Excavators, Material Handlers, Knuckle Boom Log Loaders, and Certain Forestry Equipment*

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