# Stabiliser Forces

ALLMI Guidance Note 013

Many factors influence the force found at a loader crane stabiliser support leg:

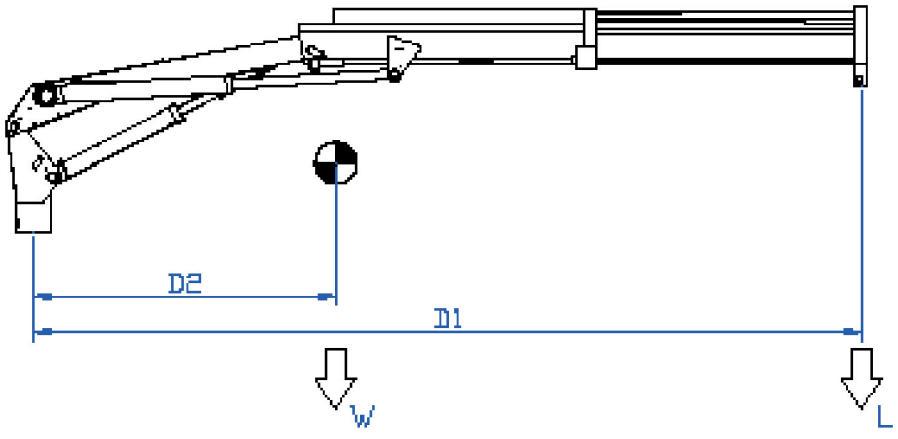
- If the vehicle is loaded or partially loaded
- The vehicle's pneumatic tyres
- The vehicle's suspension system
- The torsion resistance of the vehicle
- How hard the stabiliser jacks are deployed
- Working on sloping ground

These factors make it almost impossible to calculate the force found at the stabiliser. The calculation given below will give the maximum force that the loader crane will impose onto the stabiliser.

It should be noted that loader crane stabilisers are not designed to jack the vehicle clear of the ground. Always read the operator's instruction for the loader crane in question for instruction on how to deploy the stabilisers.

The loader crane's gross lifting moment Ma (kNm) shall be used to calculate these forces. Ma includes the moment of the load and the moment of the boom system, multiplied by the dynamic coefficient. The value of Ma should, in the first instance, be obtained from the loader crane manufacturer, but this is NOT the load moment figure shown in the manufacturer's brochure or leaflet.

If Ma is not available it can be calculated as shown below. For this calculation the dynamic coefficient is taken as 1.4. Please note this is a cautious figure based on Industry norms and it would therefore be advisable to check with the manufacturer as this could be reduced in a number of cases to as little as 1.2.

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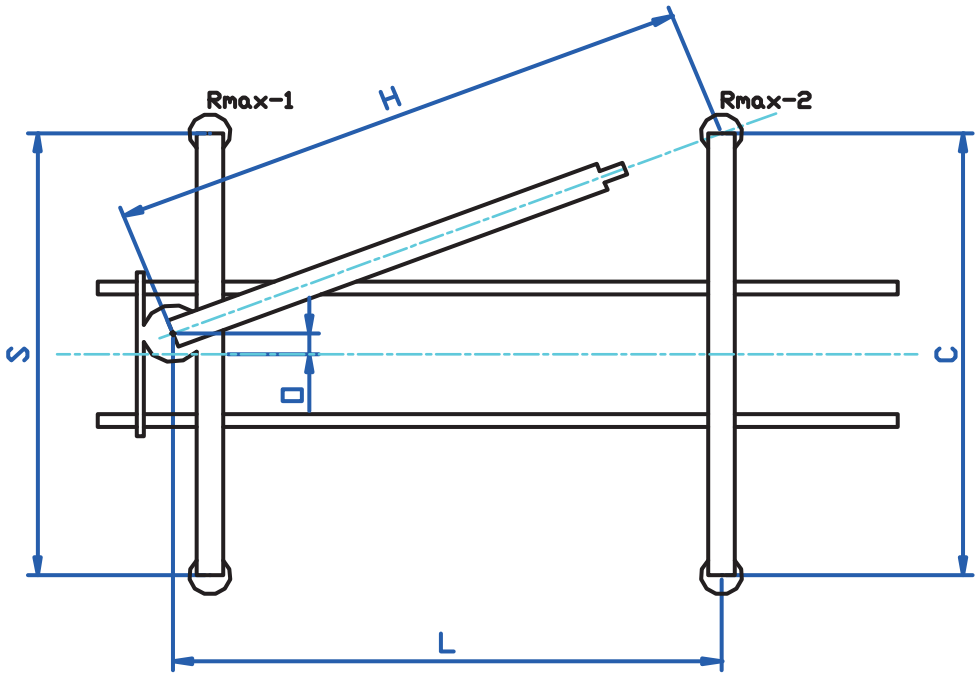
|---|---|
| Ma | Gross lifting moment, kNm |
| D1 | Maximum hydraulic radius, m |
| L | Rated capacity at maximum hydraulic radius, kg |
| D2 | Radius of the c/g for the dead weight of the loader crane, m |
| W | Dead weight of the loader crane, kg |

$$Ma = \frac{((D1 * L) + (D2 * W)) * 1.4 * 9.81}{1000} = [kNm]$$

To estimate the reactions at the stabilizers, the following formulae can be used. However, it should be remembered that these equations will return higher figures than those which will be achieved in practice.

$$R\max 1 = \frac{Ma}{(S/2) - O} = [kN] \qquad R\max 2 = \frac{Ma}{\sqrt{(L^2 + ((C/2) - O)^2)}} = [kN]$$




S = Span of loader crane stabilisers, m
C = Span of Aux. stabilisers, m
O = Off set of loader crane column, m
L = Distance Aux. stabilisers from loader crane column, m

Please note that O should not be stated as a negative value as it is intended to calculate the worse-case scenario for stabiliser loadings on the offset side of the loader.

To calculate the ground pressure, the area of the stabiliser pad must be established. Note spreader pads can be employed to reduce ground pressure. Units for pad area m²

Ground pressure, (kN/m²) $\frac{R\max}{Pad\_Area}$

**Reference information:**
BS EN 12999: Cranes – Loader Cranes
LOLER: Lifting Operations and Lifting Equipment Regulations
PUWER: Provision and Use of Work Equipment Regulations
ALLMI: Code of Practice for Installation Application and Operation
BS 7121: Safe use of cranes, Parts 2 and 4.