

# STABILITY CALCULATION FORMULA

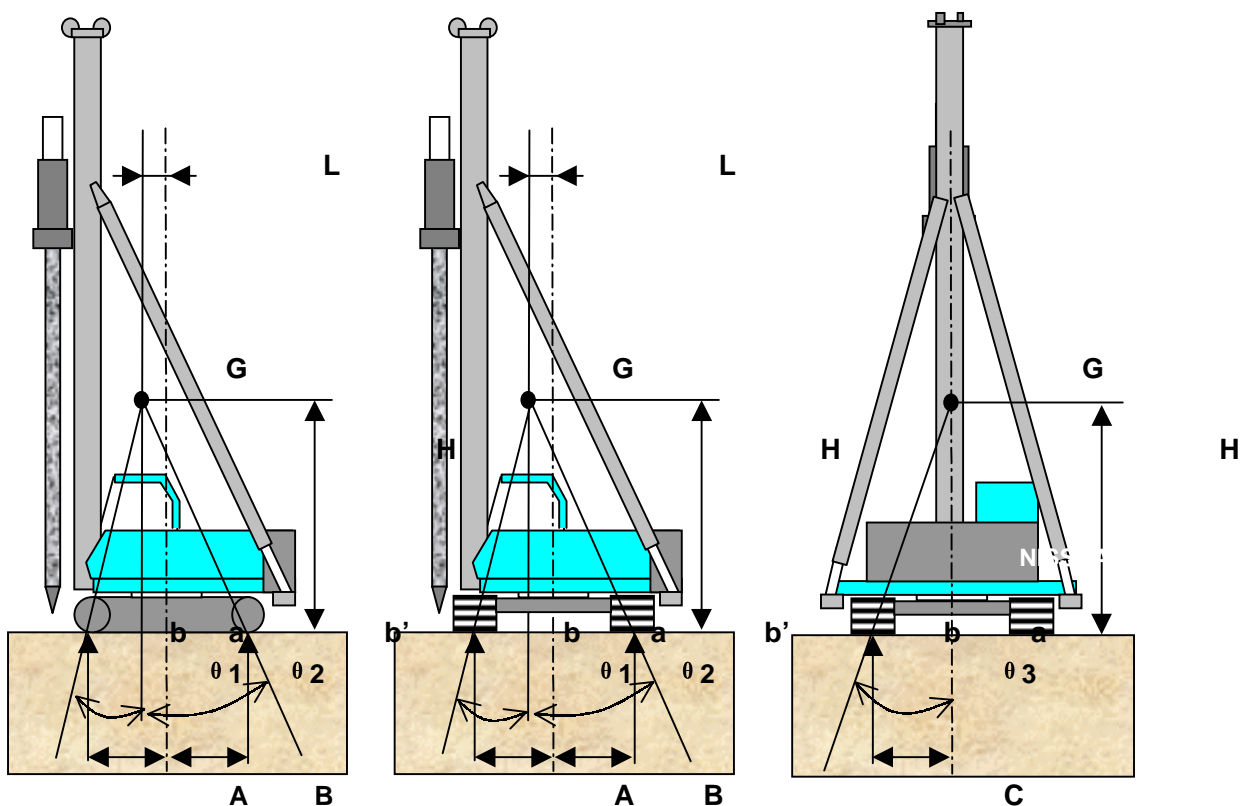
## of NISSHA DH-series 3-point supported pile driving rig

### 1. Definition “Stability”

The stability of 3-point supported pile driving rigs is identified by the angle ( $\theta$ ) which is formed by closing a vertical line (G-a) through the center of gravity (G) of the pile driving rig equipped with whole front end attachments (i.e. hammer, earth auger, pile, etc), and a line (G-b, or G-b') from G to its tipping point (b or b').

Stability (angle  $\theta$ ) to be 5 degrees and larger

The pile driving rig must be operated on firm and level surface with its stability of 5 degrees and larger under the worst operation condition of the upper revolving superstructure as shown below illustrations.



Here, **G**: Center of gravity    **L**: Distance of center of gravity    **H**: Height of center of gravity  
**A**: Distance of tipping point (Front)    **B**: Distance of tipping point (Rear)  
**C**: Distance of tipping point (Side)  
 $\theta 1$ : Front stability     $\theta 2$ : Rear stability     $\theta 3$ : Side stability

### 2. Calculation formula

$$\theta 1 = \tan^{-1} \frac{A - L}{H} \qquad \theta 2 = \tan^{-1} \frac{B - L}{H} \qquad \theta 3 = \tan^{-1} \frac{C - L}{H}$$

(Take the smallest distance among A, B or C)

As shown in the above illustration,  $\theta 1$  is the most critical operation condition of 3-point supported pile driving rig in case of general vertical pile driving work.

## *GENERAL SAFETY PRECAUTIONS*

1. The working capacity tables in the foregoing pages are based on the stability of **5 degrees** and more in pile driving operation and **9 degrees** and more ( or **7 degrees** with taking necessary countermeasures, i.e. inclining the leader several degrees toward backside) in traveling.
2. Place suitable steel plates beneath the crawlers or provide soil stabilizing in case the bearing capacity of the ground surface is insufficient compared to the average bearing pressures mentioned in the working capacity table.
3. The maximum permissible side-inclination of the leader is 1.5 degrees so that place the pile driving rig on firm and level surface as possible.
4. Follow NISSHA recommendations when any diesel generator set or hydraulic power pack is installed on the back of the pile driving rigs.