

Conversion of H/FWD deflection basins

Load pulse duration: In general, KUAB falling weight deflectometers use a pulse duration of approx. 60 milliseconds. Falling Weight Deflectometers built by Jills, Carl Bro (former Phoenix) and Dynatest have a typical load pulse duration of 25 ms. This difference does not always effect the measured deflection basin. On strong subgrades there will be almost no difference between the two load pulses. However, if the bearing capacity of the subgrade is weaker, the deflection basins will deviate more significantly.

Convert deflections to 25 ms: The table below contains the coefficients of equation (1) to convert KUAB deflections into Dynatest deflections. In practise, the geophone distances are normally placed at distances of 0, 200, 300, 450, 600, 900 and 1,200 mm, whilst Carl Bro and Dynatest Devices by tradition more likely use distances of 0, 300, 600, 900, 1,200, 1,500 and 1,800 mm.

The structure of the conversion equation is:

$$DYNA_i = a + bKUAB_0 + cKUAB_{300} + dKUAB_{600} + eKUAB_{900} + fKUAB_{1200} \quad (1)$$

Where:

$DYNA_i$ = deflection measured at a distance of i mm by a Dynatest, Jills or Carl Bro apparatus
 $KUAB_i$ = deflection measured at a distance of i mm with a KUAB device
 a to f = regression coefficients

Regression coefficients

| Distance (mm) | a | b | c | d | e | f | r ² |
|-------------------|--------|--------|-------|--------|-------|--------|----------------|
| <i>DYNA 0</i> | 20.544 | 1.080 | | | | -0.631 | 0.998 |
| <i>DYNA 300</i> | 27.268 | | 1.153 | | | -0.675 | 0.992 |
| <i>DYNA 600</i> | 22.021 | -3.90 | 1.205 | | | -0.223 | 0.989 |
| <i>DYNA 900</i> | 2.605 | | | 0.640 | | | 0.983 |
| <i>DYNA 1,200</i> | 4.697 | | | | 0.644 | | 0.985 |
| <i>DYNA 1,500</i> | 4.468 | | | | | 0.627 | 0.987 |
| <i>DYNA 1,800</i> | 6.794 | -0.350 | 1.133 | -1.323 | | 1.161 | 0.995 |

Worked example

| Distance (mm) | 0 | 300 | 600 | 900 | 1,200 | 1,500 | 1,800 |
|--|-----|-----|-----|-----|-------|-------|-------|
| <i>KUAB measured deflections (µm)</i> | 465 | 361 | 258 | 175 | 122 | | |
| <i>Dynatest-like measured deflections (µm)</i> | 446 | 361 | 248 | 168 | 117 | 81 | 53 |

Source: Van Gorp and Tholen. 'Adjustment of FWD deflection basins for load pulse duration'. Consortium SpecifiQ, 2001.