



RIGHT FIRST TIME!

*Your guide to the correct selection and usage
of BOMAG compaction equipment in accordance
with the principal U.K. Specifications*

TERMINOLOGY

The following list of terms or calculation bases serves as a help for better understanding of the technical data.

Axle load	kg	The value of the static weight (in kg) applied to an axle
Amplitude	mm	Half of the oscillation distance in millimetres (mm) that the compacting tool (plate or drum) moves during one rotation of the exciter shaft
Basic weight	Kg	The static weight of the machine without fuels and lubricants
Centrifugal force or t	kN	The force generated by the exciter shaft in kiloNewtons (kN), which causes the compaction medium (drum or plate) to vibrate. Depends on the vibrating mass of the compacting tool and the frequency. Attention: the indication of a high centrifugal mass is no guarantee for a high compaction performance.
Dimensions	mm	All dimensions in mm
Frequency	Hz	The number of revolutions the exciter shaft performs per second (Hz) or per minute (l/min) Example: 50 Hz = 50 rev./sec = 50 x 60 = 3000 rpm
Operating weight (CECE)	kg	The static weight of the machine including: Fluids and lubricants: 50% of the fuel tank contents x 0.84 (specific weight). 50% of the water tank contents. 75kg weight of the operator (only for ride on machines).
Static area load	Kg/m ²	In accordance with the operating weight of the machine in kg divided by the contact area of the base plate
Static linear load	Kg/cm or kg/m	The axle load (kg) divided by the load or working width of the drum in kg/m (cm) or (m)
Why Compact?		The compaction process consolidates material and removes air voids, thus increasing density and the load bearing capacity of the soil lift or asphalt layer
Which machine should be chosen for compaction		There are many factors that influence the choice of proper compaction equipment for a particular job. The first consideration should be the material to be compacted and the job specification being applied. Here are the most important factors: <ol style="list-style-type: none"> 1. Material type (e.g. Gravel, Sand, Silt, Asphalt mix) 2. Type of site (general applications with no restriction, trenches, confined areas, limited working widths, repairs, pothole patching. 3. Specifications (degree of density or surface smoothness required) 4. Layer thickness (if specified) 5. Production requirements
Rolling speed		Rolling speed plays an important part during vibratory compaction. With increasing speed, the compaction energy offered to a given surface area reduces. The distance between each vertical vibration movement of the vibratory compactor also increases at higher speed. When the distance between vibrations is too great, waves may result on the surface of asphalt layers. In addition to speed, the distance between vibrations is also influenced by frequency. The faster the roller and lower the frequency. The greater the distance between vibrations and the greater the rippling effect. This negatively affects the evenness of the layer. The following rolling speeds are recommended: 1 to 4 km/h for soil compaction & 2 to 6 km/h for asphalt compaction
Series 600		Earthworks in accordance with Table 6/4
Series 800		Unbound materials in accordance with Table 8/4
Series 900		Bituminous Bound Materials in accordance with Clause 903
Series 1000		Cement Bound Material in accordance with Table 10/8



Vibratory Roller

Mass per metre width of vibrating roll

$$\frac{\text{Mass}}{\text{Width (X) x Number of Rolls}}$$

Half the number of passes for double drum rollers

Vibratory Plate Compactor

Mass per SQ M² (metre) of Base Plate

Divide weight of machine by the contact surface area of base plate



$$\frac{\text{Mass}}{X \times Y}$$

= mass per sq (m²) of base plate contact area

Vibro - Tamper

Vibrating Tamper

The operating weight of the machine
To decide which one of the four categories the machine meets

1	2	3	4
50kg up to 65kg / 65kg up to 75kg / 75kg up to 100kg / over 100kg			



Mass = Weight

METHOD SPECIFICATION FOR SOILS

Material Type	Examples
COHESIVE	Most clays soils, Includes cohesive soils eg sandy soils
GRANULAR	Type 1 & 2 sub-base, hoggin, leanmix, C.B.G.B and C.B.G.M
NON-COHESIVE	Sand, P.F.A. Uniformly graded soils
BITUMINOUS	Base course and wearing course for flexible pavements

Application	Examples
Heavy Duty	Major civil engineering contracts including highways, dams, airfield and rail tracks
Medium Duty	Highway construction and maintenance, trench backfill and haunching
Light Duty	Footpaths, driveways, patching, trench backfill and forecourts

SPECIFICATION FOR HIGHWAY WORKS

Table 6/4: Compaction of Earthworks Material: Plant and Methods

The Specification contains seven Methods for various types of compaction plant

Each Method states the number of passes required for a compacted layer thickness

The Methods are:

Method 1	Wet cohesive material
Method 2	Stoney cohesive material Well graded granular material Dry cohesive material
Method 3	Uniformly graded granular material Silty cohesive material Granular drainage layers
Method 4	Uniformly graded granular material (below PFA layer)
Method 5	Course granular material (starter layer)
Method 6	Cement stabilized granular material Course and finely graded granular capping layers
Method 7	Lime stabilized cohesive material Cement stabilized cohesive material

END PRODUCT SPECIFICATION FOR SOIL

The Department of Transport Specification for the compaction of fill materials around structures (bridges etc.) is **End Product** and requires compaction to a stated percentage of density (90 - 100% depending on material) achieved in tests.

THE DEPARTMENT OF TRANSPORT SPECIFICATION FOR HIGHWAY WORKS

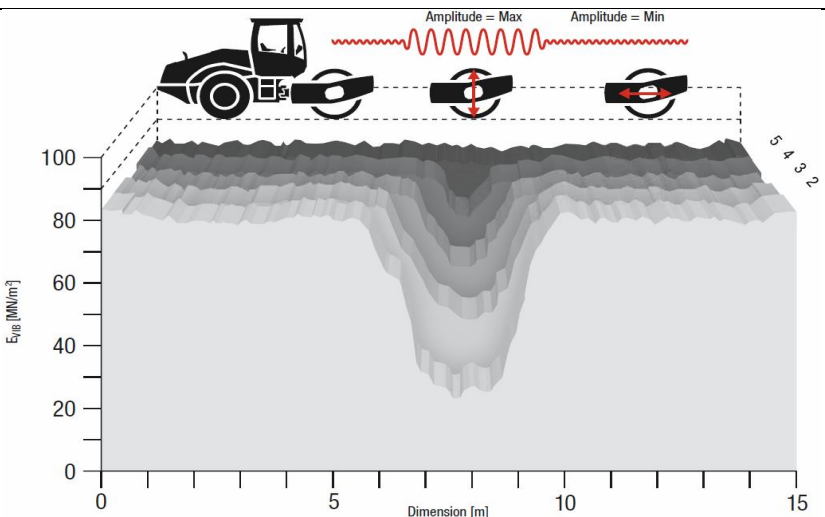
TABLE 8/4: COMPACTION REQUIREMENTS FOR UNBOUND MIXTURES

TYPE OF COMPACTION PLANT	CATEGORY	BOMAG MODEL	NUMBER OF PASSES FOR LAYERS NOT EXCEEDING THE FOLLOWING COMPACTED THICKNESSES		
			110 mm	150 mm	225 mm
SMOOTH WHEELED ROLLER (OR VIBRATING ROLLER OPERATING WITHOUT VIBRATION)	Mass per metre width of roll: Over 2700 kg up to 5400 kg	BW211D4/4i BW213D/DH4/4i BW214DH4/4i BW216DH4/4i BW211D/DH5 BW213D/DH5 BW214D5 BW216D/DH5 BW6	16	Unsuitable	Unsuitable
		BW141AD4 BW151AD5 BW154AD4 BW161AD4 BW161D-5	8	Unsuitable	Unsuitable
	Over 5400 kg	BW219DH4/4i BW226DH4/4i BW219D5 BW226DH5	8	16	Unsuitable
VIBRATORY ROLLER	Mass per/metre width of vibrating roll: Over 700 kg up to 1300 kg	BW71E2 BW80/90AD5 BW100ADM5 BW120AD5	16 8	Unsuitable Unsuitable	Unsuitable Unsuitable
	Over 1300 kg up to 1800 kg	BW135/138AD5 BW145D/DH5	3 6	8 16	Unsuitable Unsuitable
	Over 1800 kg up to 2300 kg	BW141D5 BW151D5 BW197DH5	4	6	10
	Over 2300 kg up to 2900 kg	BW177D/DH5 BW141/151/154D5 BW154AD5 BW174AP	3 2	5 3	9 5
	Over 2900 kg up to 3600 kg	BW213DH4/4i BW213D/DH5 BW6 BW161D5	3 2	5 3	9 5
	Over 4300 kg up to 5000 kg	BW216D5	Unsuitable	4	6
	Over 5000 kg	BW216D/DH5 BW219D5 BW226DH/Di5	Unsuitable Unsuitable	3 Unsuitable	5 5
	VIBRATING PLATE COMPACTOR	Mass per square metre of base plate: Below 1400 kg/2	BVP 10/30 BVP10/36 BVP18/45 BP10/35 BP12/40 BP12/50A BP20/50D BPR25/40D BPR25/50D BPR35/60D	SEE CLAUSE 802, SUB-CLAUSE 3 For procedure on use of alternative methods (Testing by proof rolling).	
Over 1400 up to 1800 kg/m2		BPR35/42D (Contractors Spec) BPR45/55D BPR55/65D BPR70/70D BPH80/65S BPR100/80D	8	Unsuitable	Unsuitable
VIBRO TAMPER	Mass : Over 50 kg up to 65 kg	BT60	4	8	Unsuitable
	Over 65 kg up to 75 kg	BT65 BVT 65	3	6	10
	Over 75 kg	BT80D	2	4	8



For further information regarding CCC, in accordance with the European CN/TS 17006 please click here for more information

www.intelligentcompaction.co.uk



THE DEPARTMENT OF TRANSPORT SPECIFICATION FOR HIGHWAY WORKS

TABLE 6/4 : METHOD COMPACTION FOR EARTHWORKS MATERIALS: PLANT AND METHODS

TYPE OF COMPACTION PLANT	CATEGORY	BOMAG MODEL	METHOD 1		METHOD 2		METHOD 3		METHOD 4		METHOD 5		METHOD 6		
			D	N	D	N	D	N	D	N	D	N	N for D=110mm	N for D=150mm	N for D=250mm
SMOOTH WHEELED ROLLER OR VIBRATORY ROLLER OPERATING WITHOUT VIBRATION	Mass per metre width of roll:														
	Over 2100 kg up to 2700 kg	BW141AD-5 BW151AD-5 BW154AD-5 BW161 ADCV-5 BW154 BW177D-5 BW177DH-5	125	8	125	10	Unsuitable	175	4	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable
	Over 2700 kg up to 5400 kg	BW161AD-5 BW174 AP4i BW161ADO (Deadweight) BW213D/DH-5 BW214D5 BW216D/DH5 BW6	125	6	125	8	Unsuitable	200	4	Unsuitable	16	Unsuitable	Unsuitable	Unsuitable	Unsuitable
	Over 5400 kg	BW219D5 BW226Di/DH5	125	6	125	8	125 8	200	4	Unsuitable	16	Unsuitable	Unsuitable	Unsuitable	Unsuitable
DEADWEIGHT TAMPING ROLLER (Padfoot Excluding Shell Kit)	Mass per metre width of roll:														
	Over 4000 kg up to 6000 kg	BW216PD/PDH5	225	4	150	12	250 4	350	4	Unsuitable	12	20	Unsuitable	Unsuitable	Unsuitable
	Over 6000 kg	BW219PD/PDH5	300	5	200	12	300 3	400	4	Unsuitable	8	12	Unsuitable	Unsuitable	20
PNEUMATIC TYRED ROLLER	Mass per wheel: Over 2500 kg up to 4000 kg	BW24RH BW27RH4i	225	4	125	10	Unsuitable	400	4	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable
VIBRATORY TAMPING ROLLER (Pad Foot)	Mass per metre width of a vibrating roll:														
	Over 700 kg up to 1300 kg	BMP8500	100	6	100	6	150 6	100	5	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable
	Over 1300 kg up to 1800 kg	BW124PDH4	125	12	125	12	Unsuitable	175	8	Unsuitable	12	Unsuitable	Unsuitable	Unsuitable	Unsuitable
	Over 1800 kg up to 2300 kg	BW145PDH-5	150	12	150	12	Unsuitable	Unsuitable	Unsuitable	8	12	Unsuitable	Unsuitable	Unsuitable	Unsuitable
	Over 2300 kg up to 2900 kg	BW177 PDH5	150	9	150	9	Unsuitable	Unsuitable	400 5	6	10	Unsuitable	Unsuitable	Unsuitable	Unsuitable
	Over 2900 kg up to 3600 kg	BW213PDH5 BW6S	200	9	200	9	Unsuitable	Unsuitable	500 6	6	10	Unsuitable	Unsuitable	Unsuitable	Unsuitable
	Over 3600 kg up to 4300 kg	BW214PD5	225	9	225	9	Unsuitable	Unsuitable	600 6	4	8	Unsuitable	Unsuitable	Unsuitable	Unsuitable
Over 5000 kg	BW216PDH5 BW219PDH5 BW226PDH5	275	9	275	9	Unsuitable	Unsuitable	800 6	3	6	Unsuitable	Unsuitable	Unsuitable	10	
VIBRATORY ROLLER	Mass per metre width of a vibrating roll:														
	Over 270 kg up to 450 kg	BW55E	Unsuitable		75	16	150 16	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable
	Over 450 kg up to 700 kg	BW71E-2 BW65H BW75H	Unsuitable		75	12	150 12	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable
			Unsuitable		75	6	150 6	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable
	Over 700 kg up to 1300 kg	BW80AD-5 BW90AD-5 BW100ADM-5 BW100AD-5 BW120AD-5	100	6	125	5	150 3	125 2	Unsuitable	16	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable
	Over 1300 kg up to 1800 kg	BW135AD-5 BW138AD-5 BW124DH	125	4	150	4	Unsuitable	175 2	Unsuitable	3	8	Unsuitable	Unsuitable	Unsuitable	Unsuitable
			125	8	150	8	Unsuitable	175 4	Unsuitable	6	16	Unsuitable	Unsuitable	Unsuitable	Unsuitable
	Over 1800 kg up to 2300 kg	BW145D-5 BW145DH-5	150	4	150	4	Unsuitable	Unsuitable	Unsuitable	4	6	Unsuitable	Unsuitable	Unsuitable	12
	Over 2300 kg up to 2900 kg	BW177D/DH-5 BW141AD-5 BW151AD-5 BW154AD-5 BW154AP-4	175	4	175	4	Unsuitable	Unsuitable	400 5	3	5	Unsuitable	Unsuitable	Unsuitable	11
			175	2	175	2	Unsuitable	Unsuitable	400 3	2	3	Unsuitable	Unsuitable	Unsuitable	6
Over 2900 kg up to 3600 kg	BW213D/DH-5 BW6	200	4	200	4	Unsuitable	Unsuitable	500 5	3	5	Unsuitable	Unsuitable	Unsuitable	10	
		200	4	200	4	275 8	Unsuitable	500 5	3	5	Unsuitable	Unsuitable	Unsuitable	10	
Over 3600 kg up to 4300 kg	BW214D-5	225	4	225	4	Unsuitable	Unsuitable	600 5	2	4	Unsuitable	Unsuitable	Unsuitable	8	
Over 4300 kg up to 5000 kg	BW216D-5	250	4	250	4	Unsuitable	Unsuitable	700 5	2	4	Unsuitable	Unsuitable	Unsuitable	7	
Over 5000 kg (BVC)	BW216D/DH-5 BW219D-5 BW226Di/DH5	275	4	275	4	Unsuitable	Unsuitable	800 5	2	3	Unsuitable	Unsuitable	Unsuitable	6	
VIBRATING PLATE COMPACTOR	Mass per m2 of base plate: Below 1400 kg/2	BVP10/30 BVP 10/36 BVP 18/45 BP10/35 BP 12/40 BP12//50A BP20/50D BPR25/45-3 BPR25/40D BPR25/50D BPR35/60D	SEE CLAUSE 612, SUB CLAUSE 6 For procedure on use of alternative methods (Testing to confirm – ie. proof rolling)												
	Over 1400 kg up to 1800 kg/m2	BPR35/42D (Contractors spec) BPR45/55D BPR55/65D BPR70/70D BPH80/65S BPR100/80D	100	6	125	6	150 4	Unsuitable	Unsuitable	8	Unsuitable	Unsuitable			
VIBRO TAMPER	Mass:														
	Over 50 kg up to 65 kg	BT60	100	3	100	3	150 3	125 3	Unsuitable	4	8	Unsuitable	Unsuitable	Unsuitable	Unsuitable
	Over 65 kg up to 75 kg	BT65 BVT65	125	3	125	3	200 3	150 3	Unsuitable	3	6	Unsuitable	Unsuitable	Unsuitable	12
	Over 75 kg	BT80D	150	3	150	3	225 3	175 3	Unsuitable	2	4	Unsuitable	Unsuitable	Unsuitable	10

THE HAUC SPECIFICATION

COMPACTION REQUIREMENTS TABLES A8.1, A8.2 and A8.3	COHESIVE MATERIALS (less than 20% granular content)			GRANULAR MATERIALS (20% or more granular content*)			BITUMINOUS MATERIALS				CHALK MATERIAL		
BOMAG COMPACTION PLANT	COMPACTION PASSES REQUIRED/ LAYERS OF COMPACTED THICKNESS UP TO			COMPACTION PASSES REQUIRED/ LAYERS OF COMPACTED THICKNESS UP TO			COMPACTION PASSES REQUIRED/ LAYERS OF COMPACTED THICKNESS UP TO				COMPACTION PASSES REQUIRED/ LAYERS OF COMPACTED THICKNESS UP TO		
	100 mm	150 mm	200 mm	100 mm	150 mm	200 mm	40 mm	60 mm	80 mm	100 mm	100 mm	150 mm	200 mm
VIBROTAMPER 50 kg minimum BT60 BT65 BVT65 BT80D	4	8	NP	4	8	NP	5	7	NR	NR	3	6	NP
VIBRATING ROLLER – SINGLE DRUM 600 – 1000 kg/m BW71E-2 BW71EHB-2	NP	NP	NP	12	NP	NP	10	12	NR	NR	12	NP	NP
VIBRATING ROLLER – TWIN DRUM 600 – 1000 kg/m BW75S-2 BW75H BW80/90/100ADM-5 BMP851 BMP8500 (Not Bituminous Materials)	NP	NP	NP	6	NP	NP	5	7	NR	NR	6	8	NP
VIBRATING ROLLER – TWIN DRUM 1000 – 2000 kg/m BW100/120AD-5 BW135/138AD-5	4	8	NP	3	6	NP	4	5	6	8	2	4	6
VIBRATING PLATE 1400 – 1800 kg/m ² BPR35/42D (Contractors Spec) BPR45/55D BPR55/65D BPR70/70D BPH80/65S BPR100/80D	NP	NP	NP	5	NP	NP	6	NR	NR	NR	6	8	NP

* including cement bound material

NP = Not permitted

NR = Not recommended

THE C.S.S. HAUNCH SPECIFICATION

BOMAG COMPACTION PLANT	GRANULAR			BITUMINOUS		
	COMPACTION PASSES REQUIRED FOR LAYERS OF COMPACTED THICKNESSES UP TO					
	100 mm	150 mm	200 mm	50 mm	75 mm	100 mm
VIBROTAMPER 50 kg minimum BT60 BT65 BT80D	4	8	12	6	9	12
VIBRATING ROLLER 600 - 1000 kg/m twin drum BW75S-2 BW75H BW80AD-5 BW90AD-5 BW100ADM-5 BMP8500 (Granular only)	6	12	Unsuitable	6	9	12
600 - 1000 kg/m single drum BW71E-2 BW71EHB-2	12	Unsuitable	Unsuitable	12	Unsuitable	Unsuitable
1000 - 2000 kg/m twin drum BW100AD-5 BW120AD-5 BW135AD-5 BW138AD-5 BMP8500 (Granular only)	3	6	12	4	6	8
Over 2000 kg/m twin drum BW141AD-4 BW151AD-4 BW154AD-4	2	3	4	3	4	5
VIBRATING PLATE Over 1400 – 1800kg/m ² BPR35/42D (Contractors Spec) BPR45/55D BPR55/65D BPR65/70D BPH80/65S BPR100/80D	5	9	Unsuitable	8	12	Unsuitable

EFFECT OF VIBRATORY ROLLERS ON ADJACENT WALLS AND BUILDINGS

The following graph shows the transmission of vibration to buildings. This graph has been formulated in accordance with the German Standard DIN4150 and British Standard BS 7385 which state that transient vibration should not exceed 3mm/sec.

At the bottom of the graph are various weight categories of machines and the vertical axis shows the vibration velocity in mm per seconds [mm/sec].

Examples:

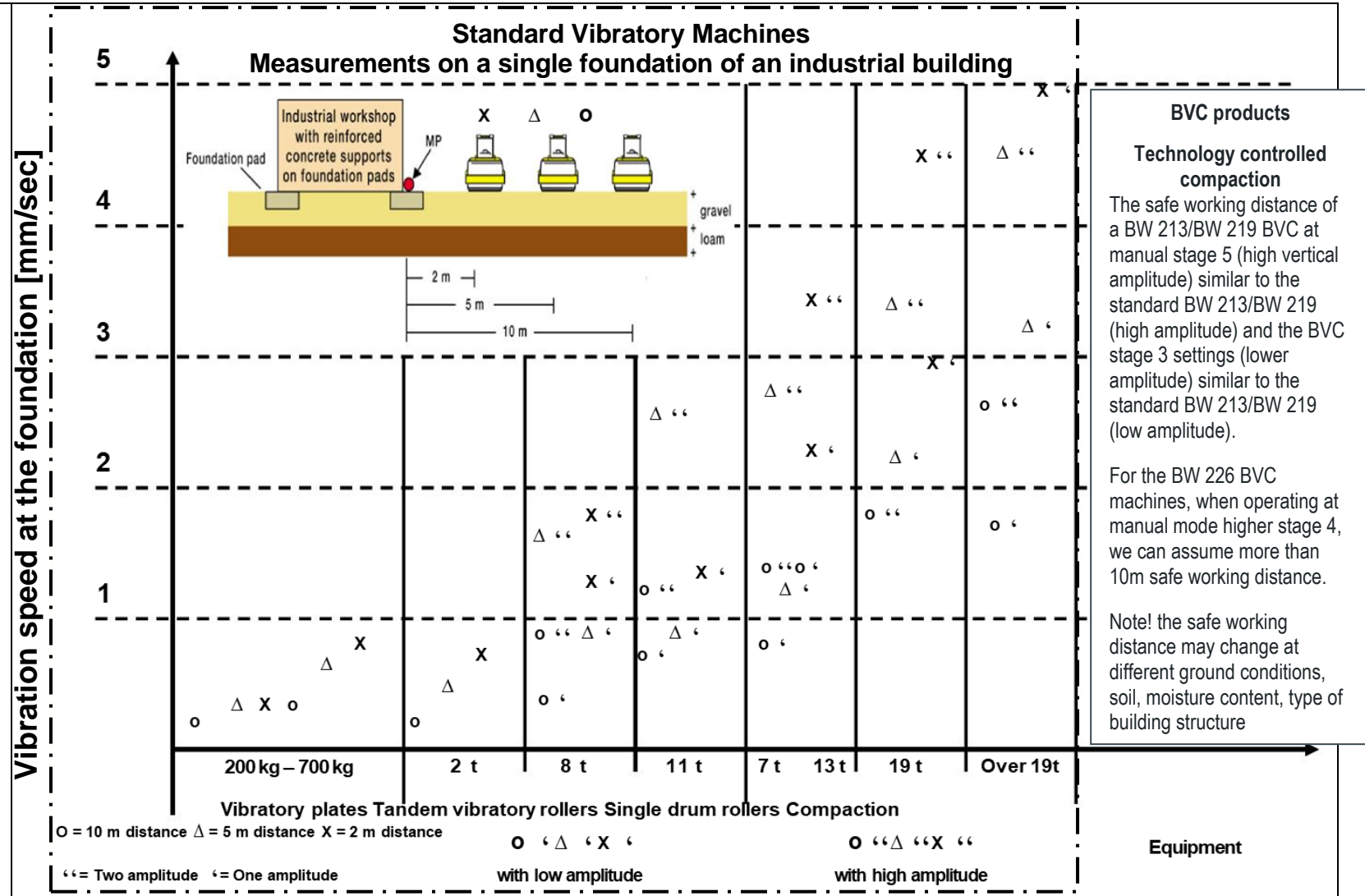
A BW120AD-5 weighing a little more than 2 tons transmits less than 1mm/sec to the measurement point (MP) at the building from a distance of 2 metres (x).

Therefore a BW120AD-5 is under the limit at a distance of 2 metres.

A BW213DH-5 weighing approximately 13 tonnes transmits less than 3 mm/sec to the measurement point (MP) at the building from a distance of 2 metres (x).

Therefore, a BW213DH-5 is under the limit at a distance of 2 metres.

The ground vibrations (or maximum velocity) are measured by transducers (sensors). They cannot be calculated by a formula since the velocity depends on the soil, moisture content, stiffness and other parameters of the ground.





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