

# NOISE & VIBRATION

- **NEW VIBRATION DIRECTIVE 2002/44/EG**
- **CONTROL OF NOISE AT WORK REGULATIONS 2005, SCHEDULE 1, PART 1**



## **NEW VIBRATION DIRECTIVE 2002/44/EG**

As of July 2005 a new Directive came into force with regard to hand/arm vibration values. This Directive is applicable to machines already in the marketplace as well as new product.

When exceeding the activation values, the employer has an obligation to fulfil the following :-

- Investigate and evaluate health risks
- Determine and execute suitable measures to reduce vibration
- Inform the employees of the risk caused by vibration and how to prevent or reduce it.
- Offer preventative medical check-ups for relevant employees

Attached you will find vibration values for BOMAG hand guided equipment which shows the hand/arm vibration level in metres per second squared and also the safe working time allowed in an 8 hour working day. In each case the safe working time shown falls within the 'green' category of daily vibration exposure, i.e. less than 2.5 m/sec<sup>2</sup>.

Following the examples given at the bottom of the chart and knowing the desired working time, the chart will indicate through the colour coding system whether further measures are required to protect the operator from excessive exposure.

Should you need any further clarification please do not hesitate to contact us again.

## VIBRATION VALUES

### HAND GUIDED MODELS

#### Hand/Arm Vibration Value

The weighted total vibration value on crushed rock determined according to ISO 5349 and EN500 in m/sec<sup>2</sup>.

Model	Hand/Arm Vibration Value (m/sec <sup>2</sup> )	Daily Vibration Load <= 2.5 m/sec <sup>2</sup> , activation value not exceeded, no danger
		Safe Working Time (Minutes)
<b>Rammers</b>		
BT60/4 4-stroke	9.3	35
BT65/4 4-stroke	9.0	37
<b>Plates – Single Direction</b>		
BP10/35	4.5	148
BP12/40	3.1	312
BP12/50A	3.5	244
BP20/50	4.0	187
BP20/50D	5.1	115
BVP10/36	3.6	231
BVP18/45	7.8	49
BP25/48	4.4	155
BP25/48D	6.5	71
<b>Plates – Reversing</b>		
BPR25/40D	6.2	78
BPR25/50D	5.8	89
BPR35/42D (standard)	7.3	56
BPR35/60D (standard)	6.7	66
BPR45/55D-4	4.6	142
BPR55/65D-4	8.7	39
BPR65/70D-4	4.8	130
BPR70/70D	6.9	63
BPR100/80D	9.4	33
BPH80/65S	Remote	-
<b>Pedestrian Single Drum</b>		
BW55E	3.9	197
BW71E-2	5.5	99
BW71EHB-2	5.5	99
<b>Pedestrian Double Drum</b>		
BW65S-2	5.2	111
BW75S-2	9.5	33
BW62H	3.2	293
BW65H	4.4	155
BW75H	5.1	115
<b>Multi-purpose Compactor</b>		
BMP851	Remote	-
BMP8500	Remote	-
<b>All BOMAG Ride-on Models</b>		
Tandem, Self-Propelled etc. etc.	< 2.5	480

If using the traffic light system, all safe usage times given fall within the 'green' zone. Should extended working time be needed, then further consideration needs to be given to hand/arm vibration.

The following Table shows the daily vibration load or exposition period at corresponding vibration value (vector sum) of the machine.

Vibration magnitude m/sec <sup>2</sup>	Exposure Time											
	[hours]	0,1	0,2	0,5	1	2	3	4	5	6	7	8
	[min]	6	12	30	60	120	180	240	300	360	420	480
[m/sec <sup>2</sup> ]		Daily vibration load in [m/sec <sup>2</sup> ]										
0,5		0,1	0,1	0,1	0,2	0,3	0,3	0,4	0,4	0,4	0,5	0,5
1		0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	0,9	1,0
1,5		0,2	0,2	0,4	0,5	0,8	0,9	1,1	1,2	1,3	1,4	1,5
2		0,2	0,3	0,5	0,7	1,0	1,2	1,4	1,6	1,7	1,9	2,0
2,5		0,3	0,4	0,6	0,9	1,3	1,5	1,8	2,0	2,2	2,3	2,5
3		0,3	0,5	0,8	1,1	1,5	1,8	2,1	2,4	2,6	2,8	3,0
3,5		0,4	0,6	0,9	1,2	1,8	2,1	2,5	2,8	3,0	3,3	3,5
4		0,4	0,6	1,0	1,4	2,0	2,4	2,8	3,2	3,5	3,7	4,0
4,5		0,5	0,7	1,1	1,6	2,3	2,8	3,2	3,6	3,9	4,2	4,5
5		0,6	0,8	1,3	1,8	2,5	3,1	3,5	4,0	4,3	4,7	5,0
5,5		0,6	0,9	1,4	1,9	2,8	3,4	3,9	4,3	4,8	5,1	5,5
6		0,7	0,9	1,5	2,1	3,0	3,7	4,2	4,7	5,2	5,6	6,0
6,5		0,7	1,0	1,6	2,3	3,3	4,0	4,6	5,1	5,6	6,1	6,5
7		0,8	1,1	1,8	2,5	3,5	4,3	4,9	5,5	6,1	6,5	7,0
7,5		0,8	1,2	1,9	2,7	3,8	4,6	5,3	5,9	6,5	7,0	7,5
8		0,9	1,3	2,0	2,8	4,0	4,9	5,7	6,3	6,9	7,5	8,0
8,5		1,0	1,3	2,1	3,0	4,3	5,2	6,0	6,7	7,4	8,0	8,5
9		1,0	1,4	2,3	3,2	4,5	5,5	6,4	7,1	7,8	8,4	9,0
9,5		1,1	1,5	2,4	3,4	4,8	5,8	6,7	7,5	8,2	8,9	9,5
10		1,1	1,6	2,5	3,5	5,0	6,1	7,1	7,9	8,7	9,4	10,0
Risk class according to vibration protection directive 2002/44/EG:												
Daily vibration load <= 2,5 m/s <sup>2</sup> , activation value not exceeded, no danger												
Daily vibration load 2,5 - 5 m/s <sup>2</sup> , activation value exceeded, measures required												
Daily vibration load > 5 m/s <sup>2</sup> , exposition limit value exceeded												
Application examples:												
1) What is the daily vibration load if gravel is compacted for 3 hours with the given machine vibration value 3,5 m/s <sup>2</sup> ?												
Acc. to the Table it results in a daily vibration load of 2,1 m/s <sup>2</sup> . Thus it ranges below the activation value of 2.5 m/s <sup>2</sup> .												
Provisions are not necessary.												
2) What is the permissible working time (exposition period) at given machine value 3.5 m/s <sup>2</sup> ?												
Acc. to the Table, with 3.5 m/s <sup>2</sup> and the a permissible daily load of 2.5 m/s <sup>2</sup> it results in a permissible working time of 4 hours.												

## **NEW NOISE AT WORK REGULATIONS**

A new European Directive has been adopted which means we must follow new U.K. Noise Regulations by April 2006.

Directive 2003/10/EC on the minimum health and safety requirements regarding exposure of workers to the risks arising from physical agents (noise).

As a European manufacturer and market leader, we follow and comply with new rules and regulations as they come into force. We are, however, at a slight disadvantage since our equipment is not static in a factory, but mobile and used on a variety of soil conditions and site locations. BOMAG Head Office is currently seeking clarification from Brussels as, not only engine noise, but working noise needs to be considered.

The UK Health and Safety Executive have issued guidelines on their website which details quite clearly the current position. They have also prepared an exposure calculator, much the same as HAV.

The noise calculator can help you to work out your overall daily noise exposures. It is able to take into account up to 8 different activities. In addition, there is an exposure time calculator which tells you how long you can be exposed to any specified noise level before reaching various possible action levels. Further information can be obtained from HSE 0845 345 0055.

**Action Levels** are basically a noise exposure level at which employers are required to take certain steps to reduce the harmful effects of noise on hearing.

When the new Noise Control at Work Regulations are implemented in April 2006, the action levels will be lowered; the first level being 80 dB(A) and the second 85 dB(A) being the upper level. There will also be a limit value of 87 dB(A) above which no worker can be exposed (taking hearing protection into account).

Considering the type of equipment we manufacture and the application, it is prudent that we consider both the first level (where the employer has to provide information and training and make hearing protection available) and the second level (where the employer is required to take reasonably practical measures to reduce noise exposure, such as engineering controls or other technical measures).

The use of hearing protection is also mandatory if the noise cannot be controlled by these measures or whilst these measures are being planned or carried out.

We have provided below a summary of the relevant information relating to both Hand/Arm Vibration and Noise. Please note that the noise levels relate the upper level of 85 dB(A).

## Noise Values

The sound pressure level at the operator's ear determined according to ISO 11204 and EN500 in dB(A).

Model	HAV m/sec <sup>2</sup>	Safe Working Time (mins)	Noise Level at operator's ear under typical working conditions dB(A)	Upper exposure level Safe daily working time with ear protection (minutes)
<b>Rammers</b>				
BT60/4 4-stroke	9.3	35	98	24
BT65/4 4-stroke	9.0	37	95	47
<b>Plates – Single Direction</b>				
BP10/35	4.5	148	88	240
BP12/40	3.1	312	92	95
BP12/50A	3.5	244	92	95
BP20/50	4.0	187	92	95
BP20/50D	5.1	115	92	95
BVP10/36	3.6	231	93	76
BVP18/45	7.8	49	95	47
BP25/48	4.4	155	98	24
BP25/48D	6.5	71	92	95
<b>Plates – Reversing</b>				
BPR25/40D	7.3	56	93	76
BPR25/50D	7.3	56	95	47
BPR35/42D	7.3	56	94	60
BPR35/60D	6.7	66	94	60
BPR45/55D-4	4.6	142	95	47
BPR55/65D-4	8.7	39	96	38
BPR65/70D	4.8	130	96	38
BPR70/70D	6.9	63	95	47
BPR100/80D	9.4	33	94	60
BPH80/65S	Remote	Remote	91	120
<b>Pedestrian Single Drum</b>				
BW55E	3.9	197	88	240
BW71E-2	5.5	99	84	> 8 hours
BW71EHB	5.5	99	92	95
<b>Pedestrian Double Drum</b>				
BW65S-2	5.2	111	84	> 8 hours
BW75S-2	9.5	33	86	381
BW62H	3.2	293	87	302
BW65H	4.4	155	87	302
BW75H	5.1	115	89	191
<b>Multi-purpose Compactor</b>				
BMP851	Remote	Remote	86	381
BMP8500	Remote	Remote	85	8 hours
<b>Light Tandems</b>				
BW80AD-2	< 2.5	480	84	> 8 hours
BW80AD-5	< 2.5	480	84	> 8 hours
BW100AD-4	< 2.5	480	84	> 8 hours
BW120AD-4	< 2.5	480	84	> 8 hours
BW125AD-4	< 2.5	480	84	> 8 hours
BW135AD	< 2.5	480	81	> 8 hours
BW138AD	< 2.5	480	83	> 8 hours

Model	HAV m/sec <sup>2</sup>	Safe Working Time (mins)	Noise Level at operator's ear under typical working conditions dB(A)	Upper exposure level Safe daily working time with ear protection (minutes)
<b>Heavy Tandems</b>				
BW141AD-4	< 2.5	480	84	> 8 hrs
BW151AD-4	< 2.5	480	84	> 8 hrs
BW154AD-4	< 2.5	480	84	> 8 hrs
BW161AD-4	< 2.5	480	84	> 8 hrs
<b>Self-Propelled Rollers</b>				
BW177DH-4	< 2.5	480	80	> 8 hrs
BW213DH-4	< 2.5	480	85	8 hrs
BW216DH-4	< 2.5	480	80	> 8 hrs
BW219DH-4	< 2.5	480	80	> 8 hrs
BW226DH-4	< 2.5	480	77	> 8 hrs
BW332	< 2.5	480	72	> 8 hrs
<b>Towed Rollers</b>				
BW6	-	-	-	-
BW6S	-	-	-	-
<b>Pneumatic Tyred Rollers</b>				
BW24RH	< 2.5	480	72	> 8 hrs
BW27RH	< 2.5	480	74	> 8 hrs
<b>Recyclers/Stabilizers</b>				
MPH122-2	< 2.5	480	84	> 8 hrs
MPH125	< 2.5	480	82	> 8 hrs
<b>Landfill Compactors</b>				
BC472RB	< 2.5	480	74	> 8 hrs
BC472RS	< 2.5	480	74	> 8 hrs
BC572RB-2	< 2.5	480	75	> 8 hrs
BC672RB-2	< 2.5	480	73	> 8 hrs
BC772RB-2	< 2.5	480	73	> 8 hrs
BC772RS-2	< 2.5	480	73	> 8 hrs
BC972RB-2	< 2.5	480	74	> 8 hrs
BC1172RB-2	< 2.5	480	74	> 8 hrs
<b>Cold Milling Machines</b>				
BM1000/30	< 2.5	480	88	240
BM1200/30	< 2.5	480	91	120
BM1300/30	< 2.5	480	92	95
BM1500/50	< 2.5	480	97	30
BM2000/50	< 2.5	480	95	47
BM2000/60	< 2.5	480	92	95
<b>Asphalt Pavers</b>				
BF222C	< 2.5	480	84.5	> 8 hrs
BF223C	< 2.5	480	84.5	> 8 hrs
BF300C	< 2.5	480	94	60
BF600C	< 2.5	480	83	> 8 hrs
BF600P	< 2.5	480	83	> 8 hrs

**Note :** The time allowed for noise may in fact be shorter than that of HAV.