

# Hand Arm Vibration (HAVs) Guidance



**Hand-Arm vibration is mechanical vibration which is transmitted into the hand and arms of a worker by the equipment they are using. This can be from a powered hand tool such as a sander, hand-guided machines such as a floor polisher, or hand-fed equipment, e.g. where the worker presents and holds the work to a bench grinder or a punching appliance.**

## Symptoms and effects from Vibration

Vibration can cause many forms of ill health to persons who are exposed to unsafe levels as part of their work activities.

- Grip strength can be reduced due to nerve and muscle damage
- Numbness, pain and cold in arms and hands as well as reduced manual dexterity.
- Neurological symptoms of HAVs include numbness and tingling in the fingers, and a reduced sense of touch and temperature.
- Back pain – more likely to be suffered using hand-guided tools such as Wacker plates, demolition hammers or lawn mowers.
- Vibration White Finger. This is a set of common effects which include: whitening or blanching of the fingertips, numbness and tingling in the fingers or hands, cysts in the finger and wrist bones, and loss of sensitivity of touch.

Some people will be at further risk and will need to be considered such as: Employees with existing HAVs or other diseases of the hands, arms, wrists or shoulders. Employees with diseases affecting blood circulation, e.g. diabetes, or nerve disorders affecting the hands or arms, e.g. carpal tunnel syndrome, a disorder of the hand and arm giving rise to tingling, numbness, weakness, pain and night-waking.

# Hand Arm Vibration (HAVs) Guidance



## What employers must do.

- 1.** Identify the equipment that produces vibration and obtain the magnitude levels associated with each appliance. The manufacturer will provide this information, usually shipped with the appliance, but can also be obtained via their web site. Note. The vibration magnitude alone is not enough information, even though you can assume that a tool with a vibration magnitude of  $15\text{m/s}^2$  compared to a tool with  $10\text{m/s}^2$  is likely to be more hazardous.
- 2.** To complete the picture and to correctly assess the risk, the duration of the activity the worker is exposed to vibration must be identified. This is commonly referred to as the 'trigger' time which is not just how long you are holding a tool or piece of equipment, but how long you are in contact with it while it is on, and while it is vibrating.

**Example. A joiner may be using two drills throughout the day. Both have known vibration magnitudes. One for drilling into brick (measured at  $10\text{m/s}^2$ ) and one for drilling into wood (measured at  $5\text{m/s}^2$ ).**

**The joiner drills only 10 holes into masonry, each hole takes 12 seconds. The total trigger time is therefore 120 seconds (2 minutes).**

**The joiner drills 100 holes into wood, each hole takes 6 seconds. The total trigger time is 600 seconds (10 minutes).**

So although the hammer drill has twice the vibration magnitude, the trigger time is much less (one fifth) than the wood drill and is therefore safer to use for this particular job.

In this example, both tools (and any other power tools such as a sander) would be considered and added together to calculate the total daily HAV exposure for the joiner.

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Obtaining the trigger time should be either 'observed' or established using personal monitors. Estimating this value often leads to under-estimation and leads to false results leaving the worker unprotected.

Once accurate information is obtained, then the simplest way to determine if the exposure levels are safe is to use the HSE HAVs Calculator which establishes the daily exposure rates from several tools deployed on the same day. An alternative is to use the HSE ready reckoner (see below).

Either method requires only the two values determined above (for each appliance) and this returns a simple points score translating to two measures, the exposure action value (EAV) and/or the exposure limit value (ELV).

A daily EAV of 2.5 m/s<sup>2</sup> represents a clear risk requiring management and control measures.

A daily ELV of 5 m/s<sup>2</sup> that represents a high risk above which employees should not be exposed.

In our examples above the hammer drill would reach ELV after 2 hours trigger time and the wood drill would reach ELV on 8 Hours.

**3.** Identify who can be exposed to the vibration whether individuals or groups of workers. Other issues should be considered, for example, establish whether the worker is a smoker, have they ever suffered from problems caused by exposure to vibration? Issue HAV self-assessment forms to those exposed to vibration.

Employers must reduce the risks from vibration to the lowest level reasonably practicable and to reduce exposure to as low as is reasonably practicable if it is above the EAV.

# Hand Arm Vibration (HAVs) Guidance



## Record the findings

I.e., Create and develop a HAVs risk assessment to include the following:

- The employees' activities, operations and HAV self-assessment.
- A description of the tools deployed. (Note. Similar tools made by the same manufacturer may have different magnitudes of vibration).
- Any vibration control measures already in place; (E.g. Sourcing only from manufacturers with comparatively low-levels of vibration or for example, using personal monitors to record 'live' data).
- The likely vibration magnitudes (levels) and sources of this data, (manufacturers' information, databases, observations of trigger times, consultants' advice etc.)
- The people whose daily vibration exposures are likely to exceed the exposure action value and/or the exposure limit value.
- The immediate measures taken to reduce exposure below the exposure limit value if the assessment shows it is likely to be exceeded. (For example, rotation of work activities, factoring in regular breaks from using vibrating tools, ensuring tools have a regular maintenance schedule and are in good order.)
- Provide information and training to those exposed to vibration.
- Identify those who should undergo health surveillance. (Workers likely exposed to the higher levels of vibration or are already suffering from exposure to vibration).
- Any further information necessary to help you comply with your duty to reduce exposure and control risk.
- The date of the assessment.
- The person who conducted the assessment.

**4.** To ensure controls remain effective and continue to protect the employee, the assessment should be reviewed at least annually or if there are changes to the work processes or equipment used.

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## HSE Ready Reckoner

V i b r a t i o n	40	801																		
	30	450	901	1351																
	25	313	626	938	1251															
	20	200	400	600	801	1201														
	19	181	361	542	723	1084	1445													
	18	162	324	486	649	973	1297													
	17	145	289	434	578	868	1157	1446												
	16	128	256	384	512	769	1025	1281												
	15	113	225	338	450	676	901	1126	1351											
	14	98	196	294	392	588	785	981	1177	1373										
13	85	169	254	338	507	677	846	1015	1184	1350										
12	72	144	216	288	432	576	721	865	1009	1153	1297	1441								
11	61	120	182	242	363	484	605	725	848	969	1090	1211	1332	1450						
10.5	55	110	166	221	331	441	552	662	772	883	993	1103	1214	1324	1434					
10	50	100	150	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400				
9.5	45	90	135	181	271	361	452	542	632	723	813	903	994	1084	1147	1265	1355	1445		
9	41	81	122	162	243	324	405	486	567	649	730	811	892	973	1054	1135	1216	1297		
8.5	36	72	108	145	217	289	362	434	506	578	651	723	795	868	940	1012	1087	1157	1446	
8	32	64	96	130	192	256	320	384	448	512	576	641	705	769	833	897	961	1025	1281	
7.5	28	56	84	113	169	225	281	338	394	450	507	563	619	676	732	788	844	901	1126	
7	25	49	75	98	147	196	245	294	343	392	441	490	539	588	638	637	736	785	981	
6.5	21	42	63	85	127	169	211	254	296	338	381	423	465	507	550	592	634	677	846	
6	18	36	54	72	108	144	180	216	252	288	324	360	396	432	468	504	540	576	723	
5.5	15	30	45	61	91	121	151	182	212	242	272	303	333	363	394	424	454	484	605	
5	13	25	38	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	500	
4.5	10	20	30	41	61	81	101	122	142	162	182	203	223	243	263	284	304	324	405	
4	8	16	24	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	320	
3.5	6	12	18	25	37	49	61	74	86	98	110	123	135	147	159	172	184	196	245	
3	5	9	14	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	180	
2.5	3	6	9	12	18	25	31	38	44	50	56	63	69	75	81	88	94	100	125	
		15 m	30 m	45 m	1 h	1.5h	2 h	2.5 h	3 h	3.5 h	4 h	4.5h	5 h	5.5 h	6 h	6.5h	7 h	7.5h	8 h	10 h

The HSE HAV Calculator can be downloaded from the following link.

<https://www.hse.gov.uk/vibration/hav/vibrationcalc.htm>

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**Spectra can support you and provide documents to help monitor employees health.**

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