

## Hand arm vibration syndrome: Designing out the risks for anchor installers.

An article for the CFA website

by Carlos Taborda,

Product Manager – Hilti GB Ltd.



*For the last few years the construction industry has been facing the challenges of a group of painful and disabling conditions caused by potentially high levels of vibration from tools and equipment (such as concrete breakers, drills and impact wrenches amongst others) used for prolonged periods of time. Carlos Taborda – Product Manager for Hilti GB Ltd, sets out the legal requirements for this challenging topic along with practical steps which can be taken by contractors and specifiers to satisfy them.*

### INTRODUCTION

The general term for which these conditions are known is Hand Arm Vibration Syndrome (HAVS). There is no effective treatment and sufferers may even have to give up everyday tasks. The most well known form of HAVS is Vibration White Finger (VWF) which is a disorder of the blood supply to the fingers and hand. The Health and Safety Executive estimates that there are around 300.000 people with advanced stage of VWF, making it the most common prescribed disease under the Industrial Injuries Scheme (IIS) in recent years. (See <sup>[1]</sup>)

Hand Arm Vibration Syndrome (HAVS) is an issue for everyone in today's construction industry. From the power tool user on site to contractor, designer, client and manufacturer, each has obligations to eradicate its debilitating effects.

### What the law says

On 21<sup>st</sup> May 2002, the council of Ministers and the European Parliament adopted a joint test for a Physical Agents Directive regarding exposure of workers to the risks arising from vibration. The Directive was published in the Official Journal of the European Communities on 6 July 2002 as Directive 2002/44/EC and has now come into force.

The UK is implementing the Directive by making regulations under the Health and Safety at work Act 1974. The new Control of Vibration at Work Regulations 2005 have now been published and came into force in July 2005.

In the regulations implemented in the UK, 'daily exposure' means the quantity of mechanical vibration to which a worker is exposed during a working day, normalised to an 8 hour reference period, which takes account of the magnitude and duration of the vibration.

2 levels of exposure were introduced:

- **Exposure Action Value (EAV):** the daily exposure action value is  $2.5 \text{ m/s}^2 \text{ A}(8)$ . If reached or exceeded action must be taken to reduce the risk, for example by job rotation.
- **Exposure Limit Value (ELV):** the daily exposure limit value is  $5 \text{ m/s}^2 \text{ A}(8)$ . This value must not be exceeded.

**IMPLICATIONS FOR THE CONSTRUCTION INDUSTRY, DESIGNERS AND SPECIFIERS.**

**The onus on manufacturers of equipment**



The issue with vibration levels can be a complex one! Currently manufacturers by law have to publish a vibration level for their power tools, this is based on BS EN 60745. Monitoring vibration levels at site level has proven to be a real challenge for the industry as a whole.

Manufacturers of drilling machines for prolonged anchor setting are designing large padded gripping areas and anti-vibration hammer mechanisms to reduce vibration levels.

Some manufacturers have also developed product selectors. Below is an example of such a selector produced by a member of the CFA for the use of their drilling machines.

Drill type	Power watts	Weight kg	Hole diameter – mm															
			4	5	6	7	8	9	10	12	14	16	18	20	22	24	25	
A	500	2.5		140 (500)														
B	1000	5.0					75 (250)					50 (150)						

For each tool the shaded area(s) indicate the range of diameters which may be drilled with the particular tool and the figures within each box show the maximum number of holes drilled to a depth of 100mm in concrete of a known grade. The first value is that which may be drilled before reaching the Exposure Action value and the second, bracketed value, is that which may be drilled before reaching the Exposure Limit Value. To assess the exposure for the installation of a certain number of anchors the drill diameter and required hole depth must be known. For instance in setting M10 drop-in anchors with a hole diameter of 12mm and a required drilling depth of 40mm, the number of holes which can be drilled, with a type A drilling machine, before reaching the EAV will be  $140 \times (100/40) = 350$ .

The Hire Association Europe and Construction Confederation have developed a colour coding system for labelling tools, based on the Traffic Light system, according to the level of vibration produced.

For contractors with employees doing more than one task involving vibration the HSE have an online calculator<sup>[4]</sup> for vibration exposure. To use this you will need the actual vibration level of the tool, which the manufacturer can tell you.

## What the contractor can do

The obligations on employers are summarised in a leaflet published by the HSE – INDG175 (Rev 2)<sup>[5]</sup>. As far as companies involved in the installation of anchors using drilling machines are concerned this means making an assessment of the exposure of each employee depending on the tasks being carried out. For drilling operations the product selector approach or HSE on-line vibration calculator referred to above may be used.

It may be that choosing a different type or size of drilling machine may reduce the overall exposure level.

If vibration levels can not be reduced at source to below the absolute exposure limit, then jobs must be redesigned or rescheduled to ensure that the overall level of exposure does not exceed the limit. Job sharing between different members of staff may be one answer.

## What the specifier can do.

Clearly at an early stage of the project Designer can make a real difference.

The Construction (Design and Management) CDM Regulations 1994 are aimed at improving the overall management and coordination of health, safety and welfare throughout all stages of a construction project to reduce the large numbers of serious and fatal accidents and cases of ill health which occur every year in the construction industry. Amongst the HSE priorities for CDM duty holders is noise and HAVS.

According to the CDM, designers have specific legal duties to carry out. The most important contribution a designer can make to improve health and safety will often be during the concept and feasibility stage. Once the design process moves into details of design and specification, designers can continue to make a significant contribution to avoidance and reduction of risks to health and safety, particularly in relation to the specifications of materials, products and substances.

For a particular job or application several different types of fixings might be used. This will result in different geometry arrangements, hole depths, diameters and drills to be used. Designers have the opportunity to assess the impact that his/her design could have on the selection of the fixings and installation of these in order to minimise HAVS risk. Some manufacturers even take this approach into account in their design software to recommend a fixing solution with the minimum HAVS impact.

Training is available for companies with a regular need to assess the exposure of their employees. Your power tool manufacturer should be able to help you with this.

[1] <http://www.hse.gov.uk/vibration/hav/statistics.htm>

[2] BS EN 50144-2-1:2000 Safety of hand-held electric motor operated tools. Particular requirements for drills.

[3] BS EN ISO 5349-2:2002 Mechanical vibration. Measurement and assessment of human exposure to hand transmitted vibration. Practical guidance for measurement at the workplace.

[4] [www.hse.gov.uk/vibration/hav/vibrationcalc.htm](http://www.hse.gov.uk/vibration/hav/vibrationcalc.htm)

[5] INDG 175 (rev 2) Control the risks from hand arm vibration

Downloadable free from the HSE website at <http://www.hse.gov.uk/pubns/indg175.pdf>

See also INDG 296 (rev 1) Hand arm vibration – advice for employees

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