

Permissible Standards for Vibrations During Blasting

In order to protect surface structures from the deleterious effect of ground vibration, regulations have been formulated in different countries. These regulations vary from country to country depending on the type and the construction materials used. In India, the Director General of Mines Safety (DGMS) through its Circular No. 7 of 1997 specified the permissible limits of ground vibration for different types of structure (Table 1.1). The DGMS Circular has categorised surface structures into two categories based on the ownership. For each category, there are three types of structure for which permissible peak particle velocity (PPV) has been specified depending on the frequency. This circular does not make reference to any scientific study conducted in India or abroad. Perhaps it was based on the experience of the DGMS on controlled blasting close to surface structures.

Table 1.1 Permissible PPV (mm/s) as per DGMS (Tech)(S&T) Circular No. 7 of 1997

Type of structure	Dominant excitation frequency, Hz		
	< 8 Hz	8 – 25 Hz	> 25 Hz
1 Buildings/ structures not belonging to the owner			
Domestic houses/ structures (Kuchha brick and cement)	5	10	15
Industrial Buildings (RCC and framed structures)	10	20	25
Objects of historical importance and sensitive structures	2	5	10
2 Buildings belonging to owner with limited span of life			
Domestic houses/ structures (Kuchha brick and cement)	10	15	25
Industrial buildings (RCC & framed structures)	15	25	50

The mining industry has been implementing the DGMS standard over the last eight years. In order to comply with permissible limits, mines decreased the size of blasts, resorted to the use of smaller blasthole diameter and/or bench height. measures reduced production and productivity and increased the cost of production. Compared to the permissible levels adopted in other countries, the vibration levels in India, particularly at frequencies below 8 Hz, appear to be conservative. With due emphasis on the safety of surface structures, it has become necessary to look into the current vibration standard. If ground vibration at a point of concern is greater than the permissible level, it has to be controlled. It is usually the maximum charge per delay that is restricted for this purpose. In reality, a large number of variables influence ground vibration. The degree to which each variable influences ground vibration is to be established and suitably incorporated in blast designs for effective control of ground vibration.