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# Mechanical vibration — Measurement and evaluation of machine vibration —

## Part 8: Reciprocating compressor systems

*Vibrations mécaniques — Mesurage et évaluation des vibrations des machines —*

*Partie 8: Systèmes de compresseurs alternatifs*

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# Foreword

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This document was prepared by Technical Committee ISO/TC 108, *Mechanical vibration, shock and condition monitoring*, Subcommittee SC 2, *Measurement and evaluation of mechanical vibration and shock as applied to machines, vehicles and structures*, in collaboration with ISO/TC 118, *Compressors and pneumatic tools, machines and equipment*.

This first edition of ISO 20816-8 cancels and replaces ISO 10816-8:2014, which has been technically revised. The main change is the addition of an annex dealing with vibration of small bore connections.

A list of all parts in the ISO 20816 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

# Introduction

ISO 20816-1 gives general guidelines for the evaluation of machine vibration by measurements on both non-rotating parts and rotating shafts. The present document, however, establishes special procedures and guidelines for the measurement and classification of mechanical vibration of reciprocating compressors. Since, in general, it is not common to measure shaft vibration, this document refers to vibration of the main structure of the compressor, including the foundation, pulsation dampers and attached pipe system. The guidance values given for these vibrations are defined primarily to classify the vibration and to avoid problems with auxiliary equipment mounted on these structures. Recommendations for measurements and evaluation criteria are provided in this document.

Typical features of reciprocating compressors are the oscillating masses, the cyclically varying torques, cylinder stretch and the pulsating forces in the cylinders, pulsation dampers and the pipe system. All these features cause alternating loads on the main supports and vibration of the compressor system. The vibration values of reciprocating compressor systems are generally larger than for rotating compressors but, since they are largely determined by the design features of the compressor, they tend to remain more constant over the life of the system than for rotating machinery.

In the case of reciprocating compressor systems, the vibration measured on the main structure of the compressor (including the foundation, pulsation dampers and piping) and quantified according to this document can only give a rough idea of the vibratory states of the components within the machine itself.

The damage which can occur when exceeding the guidance values based on experience with similar compressor systems is sustained predominantly by machine-mounted components (e.g. instrumentation, heat exchangers, filters, pumps), connecting elements of the compressor with its peripheral parts (e.g. pipelines) or monitoring instruments (e.g. pressure gauges, thermometers). The question as above which vibration values damage is to be expected largely depends on the design of these components and their fastenings. In some cases, special measurements on certain compressor system components can be required to ascertain that the vibration values do not cause damage. It also happens that, even if measured values are within the guidance values of this document, problems occur owing to the great variety of components which can be attached.

Local vibration problems as described above can be rectified by specific “local measures” (e.g. by elimination of resonances). Experience has shown, however, that it is possible in the majority of cases to state measurable quantities characterizing the vibratory state and to give guidance values for these. This shows that the measurable variables and the guidance values for acceptable vibration in most cases permit a reliable evaluation.

If the measured vibration values as given in this document do not exceed the guidance values, abnormal wear of internal compressor components caused by vibration is unlikely to occur.

The vibration values of reciprocating compressor systems are not only affected by the properties of the compressor itself but also, to a large degree, by the foundation. Since a reciprocating compressor can act as a vibration generator, vibration isolation between the compressor and its foundation can be necessary. The vibration response of the foundation and the vibration from adjacent equipment can have considerable effect on the vibration of the compressor system.