TECHNICAL REPORT

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Dynaload — Design and construction — Use and maintenance

Dynaload — Conception et construction — Utilisation et maintenance

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Contents

Page

Foreword

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This document was prepared by Technical Committee ISO/TC 118 *Compressors and pneumatic tools, machines and equipment*, Subcommittee SC 3, *Pneumatic tools and machines*.

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

The measurement of physical parameters such as noise and vibration from hand-held tools has been the subject of investigation for many years. The means by which these parameters can be obtained have resulted in a number of devices to provide for a "working load" for the tool being investigated.

The resulting data can provide the customer with relevant information using a well-defined method that is both repeatable and reproducible. The last two issues, repeatability and reproducibility, are vital where the data obtained is required to demonstrate compliance with legislative requirements.

The equipment used to provide a "load" against which the hand-held power tool can "work" should be easily constructed from common materials and provide for ease of maintenance. This publication is intended to provide the specifications and guidance for such a loading device.

The information provided is primarily intended to instruct and supplement guidance given in standards for the measurement of noise, vibration of percussive hand-held power tools.

At the time of publication of this guidance document, dynamic loading devices, such as the ones described herein, had been used for many years in conjunction with the testing of percussive power tools. In particular, the vibration test code, ISO 28927-10, specified the use of such loading devices for testing a range of power tools, including chipping hammers, rock drills and concrete breakers. However, since the published standard not specified the design of the loading device in detail, there were inevitably many small differences between the loading devices which were manufactured. The question then arose as to whether these differences affected the measured results of the tests, for which the loading devices were used.

Dynaload — Design and construction — Use and maintenance

1 Scope

This document specifies the design, construction, guidance on use and maintenance of a dynamic loading device for the following categories of hand-held power tools:

— percussive;

— rotary-percussive.

The device can be used when measurements are being made for vibration and noise including when required for specification in test standards.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

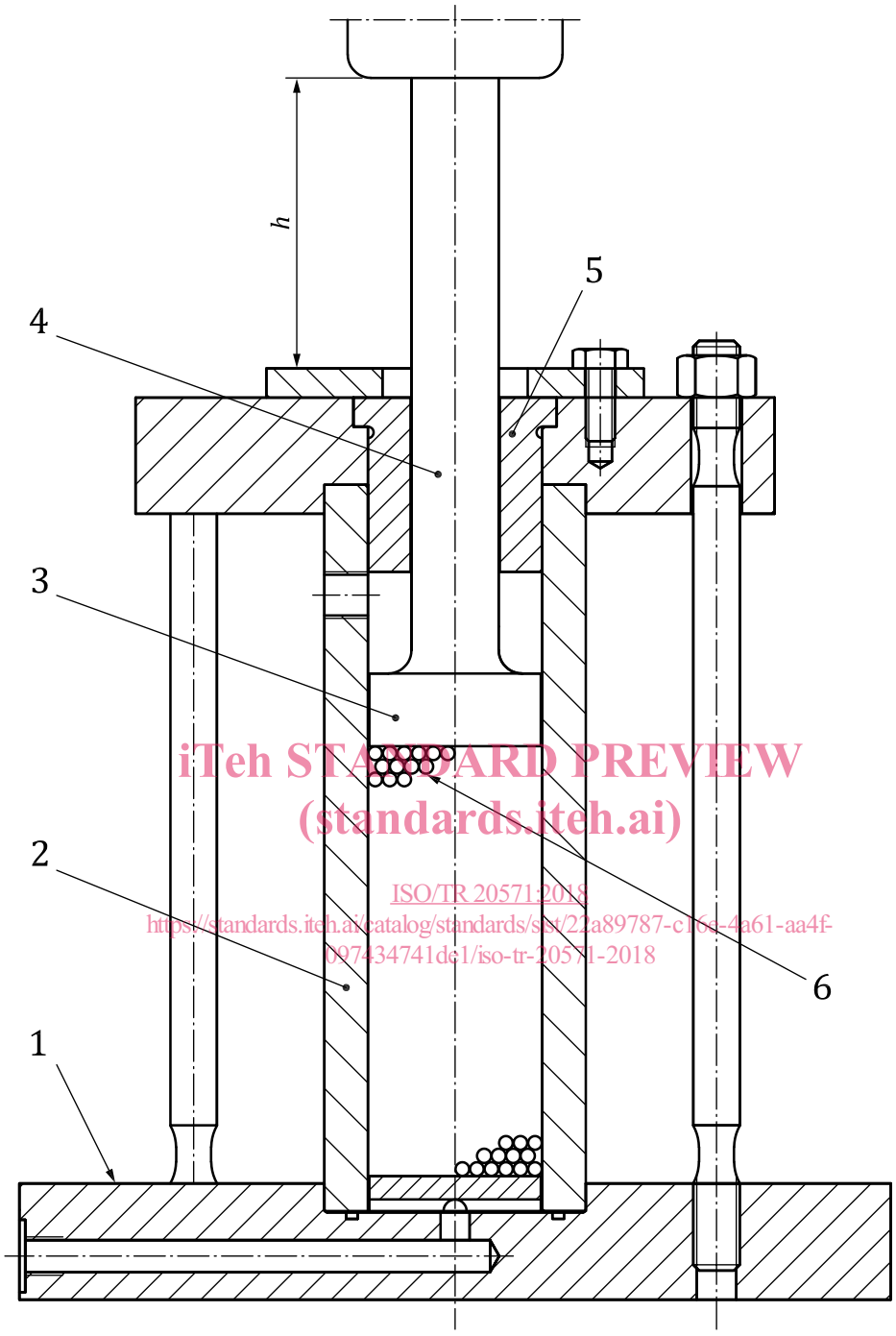
— IEC Electropedia: available at http://www.electropedia.org/

4 General

The dynamic loading device is given the common name of DYNALOAD. The device consists of a metallic cylinder filled with steel balls on which the hand-held power tool is brought to bear and which absorbs the energy transmitted by the tool. The device can either be fixed to a surface or buried below the working floor level.

Figure 1 identifies the essential items making up a Dynaload. The specification of each item is identified later in this publication.

The Dynaload device absorbs the blow energy from the power tool. Much of the shock wave is absorbed by the steel balls, however some 15 % to 20 % is reflected to the power tool, as would be the case in a normal working situation.

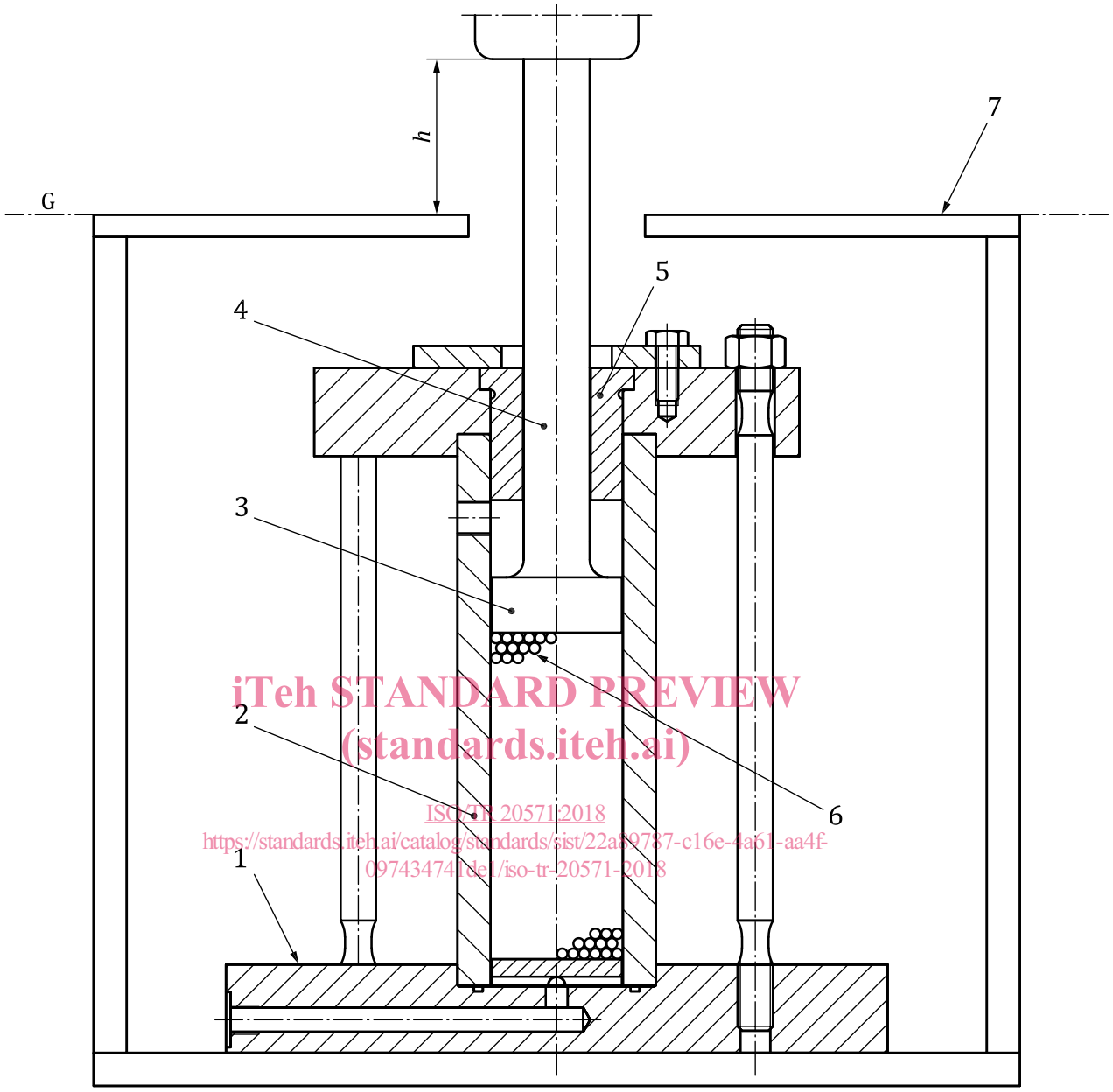


Key

1	steel plate	5	guide bush
2	cylinder	6	steel balls
3	tool foot	*h*	free length
4	tool piece		

Figure 1 — Basic elements

Figure 2 shows a typical construction of an assembly, which holds a Dynaload below ground. This would be utilised with concrete breakers, as it would afford a convenient location for the operator during testing conditions.



Key

1 steel plate
2 cylinder
3 tool foot
4 tool piece
5 guide bush
6 steel balls
7 screening slab
h free length
G ground level

Figure 2 — Below ground mounting

5 Relationship with standards

This document only specifies the Dynaload device and it is the responsibility of experts on international and other standards committees and users of this specification to:

— select the appropriate size and type of Dynaload test rig for the particular tool being tested, such as noise, vibration or performance testing;

— specify any additional requirements needed for the purpose of the test, such as mounting blocks, screening slabs, etc.;

— specify the loading and operating conditions for the tool under test.

When selecting or referring to a particular type of Dynaload test rig, the following format should be used:

Size/Type, e.g. "60 mm/Type 1 Dynaload"

where "Size" refers to the internal diameter of the cylinder (see 6.1) and "Type" refers to the design of test tool (see 6.2).

6 Design

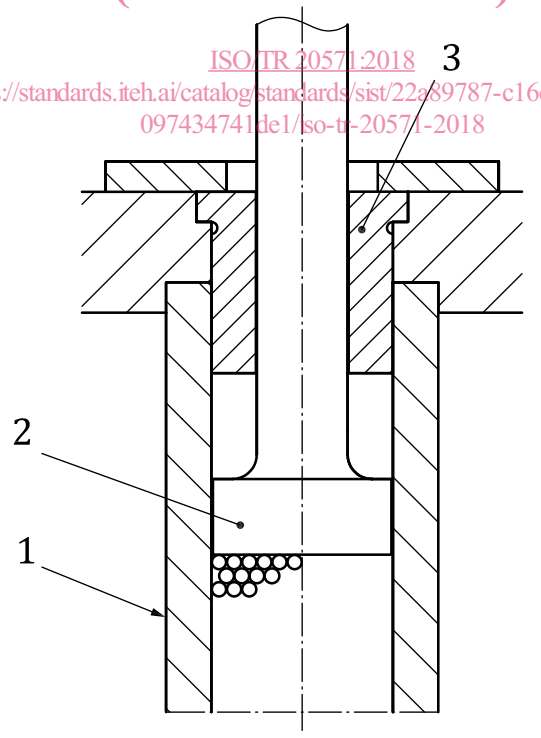
6.1 Preferred sizes

The Dynaload should be constructed to be of an appropriate size depending on the hand-held power tools to be tested. Two preferred sizes are in use, i.e. cylinder diameters of 40 mm and 60 mm, these sizes relate to the requirement for absorbed power capabilities.

6.2 Test tool

6.2.1 Type 1: 1 piece — Solid formed tool piece and tool foot

Figure 3 identifies the form of a one-part tool. A unitary construction reduces the possible sources of unwanted noise and non-smooth operation. See Annex A for a solid formed tool piece and tool foot.

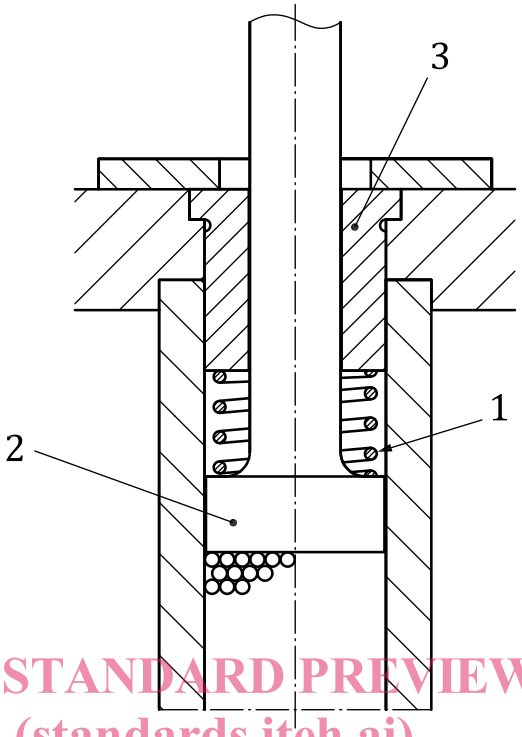


Key

1 cylinder
2 tool and tool foot as unitary assembly
3 split guide bush

Figure 3 — One-part tool (without spring)

Figure 4 shows a spring, which is utilised when the effects of recoil from certain types of percussive power tool being tested may have an adverse effect on the Dynaload assembly and consequently any readings being taken. Without spring is an option, see Annex D.



Key

1 recoil spring
2 tool and tool foot as unitary assembly
3 split guide bush

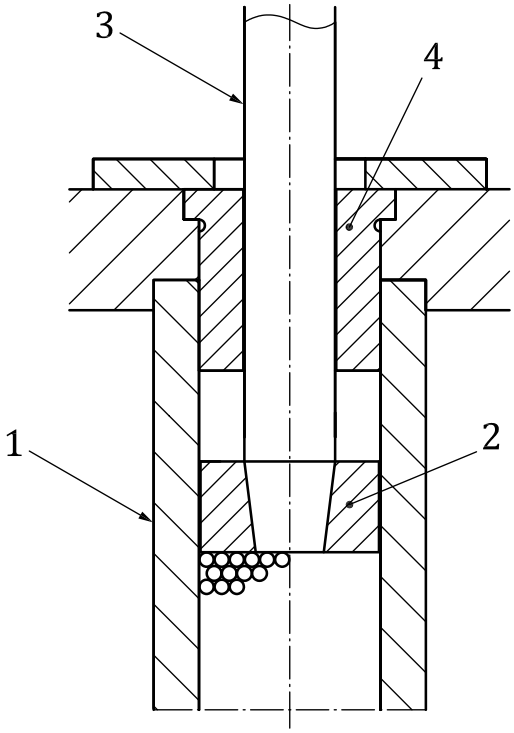
Figure 4 — One part tool (with recoil spring)

6.2.2 Type 2: Two pieces — Tapered end tool piece with a mating tool foot

The diagram in Figure 5 identifies an alternative approach to the construction of the tool piece and the tool foot. Although in separate parts in-use they act as a one-part tool.

This construction allows for a simple design for the guide bush as a one-part construction rather than that identified in Figures 3 and 4.

Standard tool steel can be modified to provide the necessary taper fit. Where the tool steel is used it should be of circular cross section and dimensioned to pass through the bush. See Annex B for tapered end tool piece with a mating tool foot.



Key

1 cylinder
2 tool foot with taper fit hole
3 tool piece with taper fit end
4 guide bush

Figure 5 — Taper fit tool piece

7 Cooling

7.1 Low pressure air cooling

Where the Dynaload is to be used for extended periods of time or repeated measurements then cooling is required, see Figure 6. This may be low pressure air blowing through the steel balls.