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Hydraulic cylinder - Method for evaluating the buckling load

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1. Structure and drafting rules for standardization documents"

Drafting.

This document is equivalent to ISO /T S13725.2021 "Hydraulic transmission hydraulic cylinder buckling load assessment method", the file type is ISO

The technical specifications are adjusted to become my country's national standardization guiding technical documents.

The following minimal editorial changes were made to this document.

--- Change the name of the standard to "Hydraulic cylinder buckling load assessment method";

--- Corrected a few editorial errors in ISO /T S13725.2021. The definition of F in Table 1 of ISO /T S13725.2021 is the most

In the text, F stands for axial load and Fmax stands for maximum allowable force, so the

symbol F_{max} is added in Table 1.

represents the maximum allowable force, and F is changed to axial load.

1 Scope

This document describes a method for evaluating the buckling load of hydraulic cylinders.

- a) The geometric model of the hydraulic cylinder is calculated as a cylinder with non-uniform cross-section;
- b) Applicable to the hydraulic cylinder installation and spherical plain bearing connection forms given in Table 2;
- c) Include a safety factor k (set by the assessor and included in the assessment report together with the calculation results);
- d) Consider possible loads that deviate from the axial direction;
- e) Consider the weight of the hydraulic cylinder and all radial loads applied to the hydraulic cylinder under different installation forms;
- f) can be implemented by a simple computer program;
- g) Applicable to the hydraulic cylinder piston rod fully extended state.

The method presented in this document is based on the elastic buckling theory and is applicable to applications in accordance with ISO 6020 (all parts), ISO 6022 and ISO 10762.

Single-acting hydraulic cylinders and double-acting hydraulic cylinders.

This method is not applicable to thin-walled hydraulic cylinders, double-rod hydraulic cylinders and plunger hydraulic cylinders.

This method is not suitable for evaluating piston rod buckling inside hydraulic cylinders.

This method does not take into account the friction of ball bearings.

Note. This method is based on the research results of Fred Hoblit and refers to the US standard NFPA/T 3.6.37.

2 Normative references

This document has no normative references.

ISO and IEC maintain databases of terminology used in standards at the following addresses.

3 Terms and definitions

There are no terms or definitions that require definition in this document.

4.1 Basic symbols

The symbols and units in Table 1 apply to this document. Dimensions and other characteristics are shown in Figures 1 and 2.

Table 1 Symbols and units

Symbol	Meaning	Unit
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C	Bending stiffness of the free end of the piston rod under lateral force	N/mm
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D1e	Cylinder outer diameter	mm
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D1i	Cylinder inner diameter	mm
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D2	Piston rod diameter	mm
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