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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Hydraulic fluid power — Fluids — Method for coding level of contamination by solid particles

Transmissions hydrauliques — Fluides — Méthode de codification du niveau de pollution par particules solides

Reference number
ISO 4406 : 1987 (E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 4406 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Hydraulic fluid power — Fluids — Method for coding level of contamination by solid particles

0 Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. Hydraulic fluids all contain a certain amount of solid particle contaminants.

1 Scope and field of application

This International Standard specifies the code to be used in defining the quantity of solid particles in fluids used in hydraulic fluid power systems.

2 Reference

ISO 3938, *Hydraulic fluid power — Contamination analysis — Method for reporting analysis data.*

3 Code definition

3.1 General

Most methods of defining solid contaminant quantities are based on the supposition that all contaminants have similar particle size distribution. This supposition may be valid for natural contaminants, such as airborne dust, but it is not valid for particles which have been circulated in an installation and subjected to crushing in pumps and separation in filters.

3.2 Basis of code

The code number corresponding to a pollution level comprises two scale numbers, which permits the differentiation of the dimension and the distribution of the particles as follows:

— the first scale number represents the number of particles larger than 5 µm per millilitre of fluid;

— the second scale number represents the number of particles larger than 15 µm per millilitre of fluid.

3.3 Allocation of scale numbers

3.3.1 The scale numbers are attributed according to the number of particles counted larger than 5 µm and 15 µm respectively, yielded in 1 ml of fluid (see the table).

3.3.2 A step ratio of two as given between the upper and lower limits for the number of particles per millilitre in the table has been adopted to keep the number of scale numbers to a reasonable limit and to ensure that each step is meaningful.

Table — Allocation of scale numbers

Number of particles per millilitre		Scale number
More than	Up to and including	
80 000	160 000	24
40 000	80 000	23
20 000	40 000	22
10 000	20 000	21
5 000	10 000	20
2 500	5 000	19
1 300	2 500	18
640	1 300	17
320	640	16
160	320	15
80	160	14
40	80	13
20	40	12
10	20	11
5	10	10
2,5	5	9
1,3	2,5	8
0,64	1,3	7
0,32	0,64	6
0,16	0,32	5
0,08	0,16	4
0,04	0,08	3
0,02	0,04	2
0,01	0,02	1
0,005	0,01	0
0,002 5	0,005	0,9

3.4 Determination of code number

3.4.1 The analysis methods given in ISO 3938 shall be used to obtain the particle count data.

3.4.2 A scale number shall be allocated to the number of particles larger than 5 µm.

3.4.3 A second scale number shall be allocated to the number of particles larger than 15 µm.

3.4.4 The two numbers shall be written one after the other and separated by a solidus (oblique stroke).

Example: A code number of 18/13 signifies that there are between 1 300 and 2 500 particles larger than 5 µm, and between 40 and 80 particles larger than 15 µm in 1 ml of a given fluid sample.

3.4.5 See annex A for graphical presentation of the code number; see annex B for tabular presentation of the code number.

4 Identification statement (Reference to this International Standard)

Use the following statement in the test reports, catalogues and sales literature when electing to comply with this International Standard:

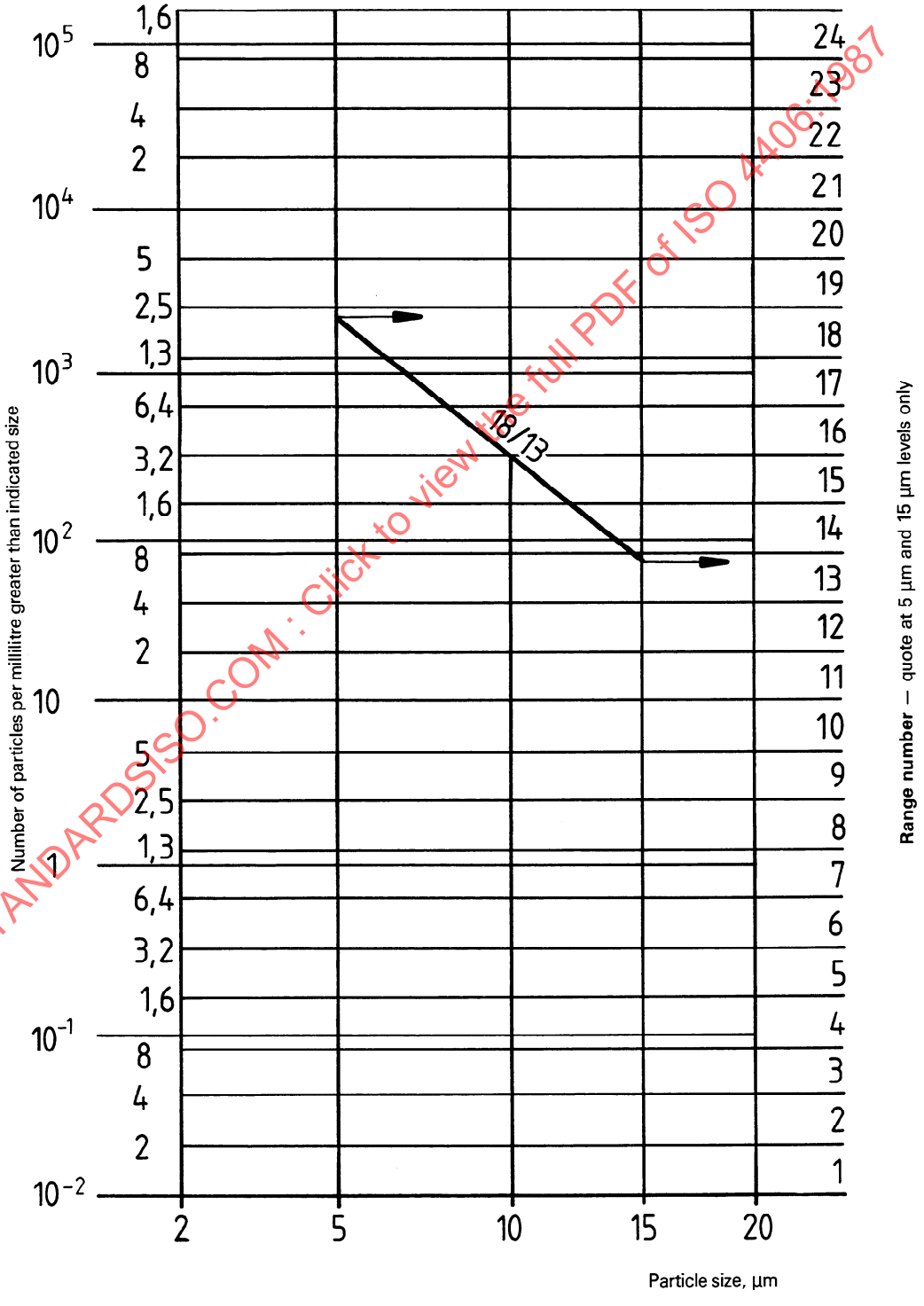
> "Solid contaminant code conforms to ISO 4406, *Hydraulic fluid power — Fluids — Method for coding level of contamination by solid particles.*"

Annex A
Graphical presentation of the code number

(This annex forms an integral part of the standard.)

The contaminant code is determined by allocating a first scale number to the total number of particles larger than 5 µm, allocating a second scale number to the number of particles larger than 15 µm, and then writing these two scale numbers one after another separated by a solidus (oblique stroke); example: 18/13.

Interpolation is acceptable; extrapolation is not permissible.



Annex B

Tabular presentation of the code number

(This annex forms an integral part of the standard.)

Code number	Number of particles per millilitre larger than			
	5 µm		15 µm	
	More than	Up to and including	More than	Up to and including
20/17	5 000	10 000	640	1 300
20/16	5 000	10 000	320	640
20/15	5 000	10 000	160	320
20/14	5 000	10 000	80	160
19/16	2 500	5 000	320	640
19/15	2 500	5 000	160	320
19/14	2 500	5 000	80	160
19/13	2 500	5 000	40	80
18/15	1 300	2 500	160	320
18/14	1 300	2 500	80	160
18/13	1 300	2 500	40	80
18/12	1 300	2 500	20	40
17/14	640	1 300	80	160
17/13	640	1 300	40	80
17/12	640	1 300	20	40
17/11	640	1 300	10	20
16/13	320	640	40	80
16/12	320	640	20	40
16/11	320	640	10	20
16/10	320	640	5	10
15/12	160	320	20	40
15/11	160	320	10	20
15/10	160	320	5	10
15/9	160	320	2,5	5
14/11	80	160	10	20
14/10	80	160	5	10
14/9	80	160	2,5	5
14/8	80	160	1,3	2,5
13/10	40	80	5	10
13/9	40	80	2,5	5
13/8	40	80	1,3	2,5
12/9	20	40	2,5	5
12/8	20	40	1,3	2,5
11/8	10	20	1,3	2,5

NOTE — The table above covers the most usual series of codes between scale numbers 8 and 20. Other codes which are not given above can be constructed from the instructions given in annex A.