SLOVENSKI STANDARD
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Naftni proizvodi - Izraļ un indeksa viskoznosti iz kinematiļ ne viskoznosti

Petroleum products -- Calculation of viscosity index from kinematic viscosity

Produits pétroliers -- Calcul de l'indice de viscosité à partir de la viscosité cinématique

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Petroleum products — Calculation of viscosity index from kinematic viscosity

Produits pétroliers — Calcul de l'indice de viscosité à partir de la viscosité cinématique

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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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 2909 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*.

This third edition cancels and replaces the second edition (ISO 2909:1981), which has been technically revised.

Petroleum products — Calculation of viscosity index from kinematic viscosity

1 Scope

This International Standard describes two procedures for calculating the viscosity index (VI) of petroleum products and related materials, such as lubricating oils, from their kinematic viscosities at 40 °C and 100 °C.

Procedure A is applicable to petroleum products of viscosity index up to and including 100.

Procedure B is applicable to petroleum products of viscosity index 100 or greater.

NOTE The results obtained from the calculation of VI from kinematic viscosities determined at 40 °C and 100 °C are virtually the same as those obtained from the former VI system using kinematic viscosities determined at 37,78 °C and 98,89 °C.

This International Standard does not apply to petroleum products with kinematic viscosities less than 2,0 mm^2/s at 100 °C. Table 1 applies to petroleum products with kinematic viscosities between 2 mm^2/s and 70 mm^2/s at 100 °C. Equations are provided for calculating the viscosity index of petroleum products having kinematic viscosities above 70 mm^2/s at 100 °C.

NOTE In cases where kinematic viscosity data are not available at temperatures of 40 °C and 100 °C, an estimate may be made of the viscosity index by calculating the kinematic viscosity at temperatures of 40 °C and 100 °C from data obtained at other temperatures. Such viscosity index data may be considered as suitable for information only and not for specification purposes.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3104:1994, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
viscosity index
VI
number used to characterize the variation of the kinematic viscosity of a petroleum product with temperature

NOTE For products of similar kinematic viscosity, the higher the viscosity index, the smaller the effect of temperature on its kinematic viscosity.

4 Principle

Kinematic viscosities at 40 °C and 100 °C are determined by a standard test method and the viscosity index is calculated from these test data using known correlations.

5 Determination

Determine the kinematic viscosity of the sample at 40 °C and 100 °C in accordance with ISO 3104.

6 Calculation

6.1 General

Calculate the viscosity index using one of the procedures given in 6.2 and 6.3.

6.2 Procedure A

6.2.1 Use procedure A for petroleum products of viscosity index up to and including 100 (see the note to 8.2).

6.2.2 If the kinematic viscosity of the petroleum product at 100 °C is in the range of 2 mm^2/s to 70 mm^2/s, extract from Table 1 the corresponding values of L and H:

where

L is the kinematic viscosity, expressed in millimetres squared per second, at 40 °C of a petroleum product of viscosity index 0 having the same kinematic viscosity at 100 °C as the petroleum product whose viscosity index is to be calculated;

H is the kinematic viscosity, expressed in millimetres squared per second, at 40 °C of a petroleum product of viscosity index 100 having the same kinematic viscosity at 100 °C as the petroleum product whose viscosity index is to be calculated.

Measured values which are not listed but which are within the range of Table 1 may be obtained by linear interpolation.

6.2.3 If the measured kinematic viscosity of the petroleum product at 100 °C is above 70 mm^2/s, calculate the values of L and H using the following equations:

$$L = 0{,}835\,3Y^2 + 14{,}67Y - 216 \quad (1)$$

$$H = 0{,}168\,4Y^2 + 11{,}85Y - 97 \quad (2)$$

where Y is the kinematic viscosity, expressed in millimetres squared per second, at 100 °C of the petroleum product whose viscosity index is to be calculated.

6.2.4 Calculate the viscosity index, VI, of the petroleum product using the following equation:

$$\mathrm{VI} = \frac{L - U}{L - H} \times 100 \quad (3)$$

where U is the kinematic viscosity, expressed in millimetres squared per second, at 40 °C of the petroleum product whose viscosity index is to be calculated.

Table 1 — Measured values of L and H for kinematic viscosity

Kinematic viscosity at 100 °C mm²/s	L	H	Kinematic viscosity at 100 °C mm²/s	L	H
2,00	7,994	6,394	6,00	57,97	38,19
2,10	8,640	6,894	6,10	59,74	39,17
2,20	9,309	7,410	6,20	61,52	40,15
2,30	10,00	7,944	6,30	63,32	41,13
2,40	10,71	8,496	6,40	65,18	42,14
2,50	11,45	9,063	6,50	67,12	43,18
2,60	12,21	9,647	6,60	69,16	44,24
2,70	13,00	10,25	6,70	71,29	45,33
2,80	13,80	10,87	6,80	73,48	46,44
2,90	14,63	11,50	6,90	75,72	47,51
3,00	15,49	12,15	7,00	78,00	48,57
3,10	16,36	12,82	7,10	80,25	49,61
3,20	17,26	13,51	7,20	82,39	50,69
3,30	18,18	14,21	7,30	84,53	51,78
3,40	19,12	14,93	7,40	86,66	52,88
3,50	20,09	15,66	7,50	88,85	53,98
3,60	21,08	16,42	7,60	91,04	55,09
3,70	22,09	17,19	7,70	93,20	56,20
3,80	23,13	17,97	7,80	95,43	57,31
3,90	24,19	18,77	7,90	97,72	58,45
4,00	25,32	19,56	8,00	100,0	59,60
4,10	26,50	20,37	8,10	102,3	60,74
4,20	27,75	21,21	8,20	104,6	61,89
4,30	29,07	22,05	8,30	106,9	63,05
4,40	30,48	22,92	8,40	109,2	64,18
4,50	31,96	23,81	8,50	111,5	65,32
4,60	33,52	24,71	8,60	113,9	66,48
4,70	35,13	25,63	8,70	116,2	67,64
4,80	36,79	26,57	8,80	118,5	68,79
4,90	38,50	27,53	8,90	120,9	69,94
5,00	40,23	28,49	9,00	123,3	71,10
5,10	41,99	29,46	9,10	125,7	72,27
5,20	43,76	30,43	9,20	128,0	73,42
5,30	45,53	31,40	9,30	130,4	74,57
5,40	47,31	32,37	9,40	132,8	75,73
5,50	49,09	33,34	9,50	135,3	76,91
5,60	50,87	34,32	9,60	137,7	78,08
5,70	52,64	35,29	9,70	140,1	79,27
5,80	54,42	36,26	9,80	142,7	80,46
5,90	56,20	37,23	9,90	145,2	81,67