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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 21450-2008

**Crude petroleum and petroleum products -- Compressibility
factors for hydrocarbons in the range 638 kg/m³ to 1 074 kg/m³**

原油和石油产品 密度在638kg/m³到1074 kg/m³范围内的烃压缩系数

(English Translation)

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Foreword

This standard is amended to use ISO 9770. 1989 "crude oil and petroleum products --- density in the range of 638kg/m³ ~ 1074kg/m³ Hydrocarbon compressibility "(in English).

This standard was drafted in accordance with ISO 9770. 1989. In accordance with the requirements of GB/T 20000.2, the reference standard in international standards at the end of this standard.

The main differences between this standard and ISO 9770. 1989.

--- According to GB/T 1885-1998 "Petroleum Meter" and the standard mathematical model supplemented prepared directly to the density of 20 °C look-up table of the compression factor table of crude oil and petroleum products, and excerpt one of the pages as Appendix B;

--- Increasing the density of 20 °C to check the application of compression coefficient table.

Compressibility tables for crude oil and petroleum products covered by this standard are to be published separately.

This standard Appendix A and Appendix B are normative appendix.

This standard proposed by the China Petrochemical Corporation.

This standard by China Petroleum & Chemical Corporation Petroleum and Chemical Research Institute centralized.

1 Scope

This standard gives the mathematical model for obtaining the compressibility of crude oil and petroleum products, calculation steps and compression factor table, the purpose is compressed by the Department Hydrocarbons at the metered temperature are corrected from the volume measured under pressure to the corresponding volume at equilibrium pressure.

Compression coefficient table specified in this standard and the measurement of

temperature and the density of the measured medium 15 °C, the temperature range of -30 °C ~ 90 °C, close Degree range of 638kg/m³ ~ 1074kg/m³.

This standard also gives by the measurement of temperature and 20 °C density direct access to the compression coefficient table, the temperature range of -30 °C ~ 90 °C, the density the range is 634kg/m³ ~ 1074kg/m³.

This standard does not include the lubricating oil compression factor.

2 Research and development process

The early compression factor standard for hydrocarbons (API 1101, Annex B, Table II) was established in 1945 with an API range of 0 ° API ~ 90 ° API [1]. It is based primarily on the limited data obtained from pure compounds and lubricants and also on the basis of mathematical models Type of research and development.

In 1981, the Working Group on the Petroleum Static Metering Commission was established to revise the API1101 compression factor table. The working group was conducted Extensive literature surveys have found compressibility information from three sources. The resulting data base is comparable to the data used in earlier standards There is a wider range, but it is not large enough to completely cover the current range of commercial operations. When the updated data is available, the new data will be merged Into the standard has been extended. This standard replaces Table II of Appendix B of API 1101, which has been repealed, and the range of API Degrees is 0 ° API ~ 100 ° API.

3 Data foundation and scope

The core of this standard is a separate printing compression coefficient table. The mathematical models and computer procedures used to generate this standard are intended solely as a basis for this standard can use them to develop computer programs for various languages and machines to reproduce the results in printed forms. Pass American stone Oil Institute can get related computer tapes, including printed table consistent with the information, the tape can be used for a variety of computer programs in development. The data foundation of this standard (see Table 1) is derived from Jessup [2], Downer and Gardiner [3] and Downer [4] and includes seven Crude oil samples, five gasoline samples and seven samples of middle distillate and heavy distillate, with the lubricant data not included. Simulation Results the results show that compared with crude oil and other refinery products, the lubricating oil belongs to a different data set and including them will result in a Uncertainty increased by 2 times. As the lubricating oil is generally measured at atmospheric pressure, so do not need to use this standard.

Test data cover the density, temperature and pressure range of 681kg/m³ ~ 934kg/m³, 0 °C ~ 150 °C and 0kPa ~ 4902kPa. Passed the tests by the American Council for the Measurement of Static Petroleum (COSM) and the Petroleum Metering Committee

(COPM), the actual model Wai can be extended to 638kg/m³ ~ 1074kg/m³, -30 °C ~ 90 °C and 0kPa ~ 10300kPa. Therefore, some parts of this standard Expressed as extrapolation results (Figure 1). For extrapolation, the uncertainty analysis in 5.1 may not be valid.

The standard incremental temperature and density intervals were 0.25 °C and 2kg/m³. For smaller increments, it is not recommended to use interpolation.

For this standard to 20 °C density table directly check the compression factor table, when the density of 20 °C is located in the table between two adjacent density, should be based on compression the different density ranges of the coefficient table and the directions of the arrows corresponding to the different demarcation densities adopt the density lookup table shown by the arrows in two adjacent densities.