

**BRITISH STANDARD**

**BS 2000 :  
Part 414 : 1996  
ISO 9950 : 1995**

**Methods of test for**

# **Petroleum and its products**

**Part 414. Industrial quenching oils -  
Determination of cooling characteristics -  
Nickel-alloy probe test method**

**(Identical with IP 414/96)**

## National foreword

This British Standard was published under the authority of the Materials and Chemicals Sector Board and comes into effect on 29 February 1996. It is identical with ISO 9950 : 1995, prepared by Technical Committee 28, Petroleum products and lubricants, of the International Organization for Standardization (ISO).

BS 2000 comprises a series of test methods for petroleum and its products that are published by the Institute of Petroleum (IP) and have been accorded the status of a British Standard. Each method should be read in conjunction with the preliminary pages of 'IP Standard methods for analysis and testing of petroleum and related products' which gives details of the BSI/IP agreement for publication of the series, provides general information on safety precautions, sampling and other matters, and lists the methods published as Parts of BS 2000.

The numbering of the Parts of BS 2000 follows that of the corresponding methods published in 'IP Standard methods for analysis and testing of petroleum and related products'. Under the terms of the agreement between BSI and the Institute of Petroleum, BS 2000 : Part 414 will be published by the IP (in 'Standard methods for analysis and testing of petroleum and related products' and as a separate publication). BS 2000 : Part 414 : 1996 is thus identical with IP 414/96.

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

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The following BSI references  
relate to the work of this  
standard:

Committee reference PTI/13  
Draft for comment 88/52802  
DC



# Industrial quenching oils — Determination of cooling characteristics — Nickel-alloy probe test method

**WARNING** – The use of this International Standard may involve hazardous materials, operations and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

## 1 Scope

This International Standard specifies a laboratory test using a nickel-alloy probe for the determination of the cooling characteristics of industrial quenching oils. The test is conducted in non-agitated oils and thus is able to rank the cooling characteristics of the different oils under standard conditions. No correlation can be made between the results of this test and the quench rates in industrial quench installations in which varying degrees of agitation are present.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2719:1988, *Petroleum products and lubricants — Determination of flash point — Pensky-Martens closed cup method.*

ISO 2909:1981, *Petroleum products — Calculation of viscosity index from kinematic viscosity.*

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

ISO 3405:1988, *Petroleum products — Determination of distillation characteristics.*

ISO 3675:1993, *Crude petroleum and liquid petroleum products — Laboratory determination of density or relative density — Hydrometer method.*

British Standard BS 1041, Part 4:1966, *Thermocouples.*

British Standard BS 4937, Part 4:1973, *Nickel-chromium/nickel-aluminium thermocouples. Type K.*

## 3 Principle

A cylindrical nickel-alloy test piece ("probe") having a thermocouple at its geometric centre is heated in a furnace to the specified temperature, and then transferred into a fixed volume of the quenching oil under test. The change in temperature at the centre of the probe is recorded as a function of time.

The cooling rate may be recorded simultaneously, or determined afterwards.

Measurements taken from these records are used to evaluate the quenching oil under test.

## 4 Reference quenching fluid

### 4.1 General

A reference quenching fluid is recommended for initial, and regular, cross-checking of the probe (see 5.2). The fluid shall be stored in a sealed container when not in use and shall be renewed after 200 quenches or two years, whichever is sooner.