

Metering pumps and dispensers to be installed at filling stations and used to dispense liquid fuel —

Part 1: Specification for construction

ICS 75.200

Committees responsible for this British Standard

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Association for Petroleum and Explosives Administration
British Cable Makers' Confederation
Council for Electrical Equipment for Flammable Atmospheres (BEAMA Ltd.)
Department of Trade and Industry (National Weights and Measures Laboratory)
Health and Safety Executive
Independent Engineering Insurers' Committee
Institute of Measurement and Control
Institute of Petroleum
Institute of Trading Standards Administration
Local Authorities Co-ordinating Body on Trading Standards
London Fire and Civil Defence Authority
National Inspection Council for Electrical Installation Contracting
National Inspection Council, Quality Assurance Ltd.
Petrol Pump Manufacturers' Association
Petrol Retailers' Association

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Foreword

This Part of BS 7117 has been prepared under the direction of the Industrial-process Measurement and Control Standards Policy Committee, and is a revision of BS 7117-1:1989 which is withdrawn. It forms Part 1 of a standard on metering pumps and dispensers to be installed at filling stations and used to dispense liquid fuel into tanks of motor vehicles, boats and light aircraft and into portable containers.

The other Parts are as follows:

- Part 2: *Guide to installation*;
- Part 3: *Guide to maintenance after installation*.

As a result of the publication of EN 13012:2001, *Petrol filling stations — Construction and performance of automatic nozzles for use on fuel dispensers*, BS 7117-1:1991 was amended to take account of the changes introduced with the publication of the European Standard. The changes implemented by Amendment No. 3:2002 are indicated in the text by a sideline.

This edition of BS 7117-1 adds clauses to incorporate recent advances in technology and clarifies certain clauses of the 1989 edition.

Attention is drawn to the existence of statutory requirements and by-laws which place responsibility for complying with specific safety requirements on the licensee and the user. At the date of publication of this standard, these include the following:

- The Health and Safety at Work, etc. Act 1974
- The Electricity at Work Regulations 1989. SI 635
- Memorandum of Guidance on the Electricity at Work Regulations 1989. HS(R)25
- The Factories Act 1961
- The Petroleum (Consolidation) Act 1928
- The Weights and Measures Act 1985

and other relevant statutory requirements or by-laws.

For detailed guidance on construction and operation of petrol filling stations the reader is directed to the Health and Safety Executive publication HS(G)41, part of which complements this British Standard.

The drawings given in this standard are not necessarily to scale and are intended only to supplement the text and to illustrate the general principles. They are not the only possible examples and they are not intended as design examples or as fully dimensioned working drawings.

Product certification. Users of this British Standard are advised to consider the desirability of third party certification of product conformity with this British Standard based on testing and continuing surveillance, which may be coupled with assessment of a supplier's quality systems against the appropriate Part of BS 5750.

Enquiries as to the availability of third party certification schemes will be forwarded by BSI to the Association of Certification Bodies. If a third party certification scheme does not already exist, users should consider approaching an appropriate body from the list of Association members.

Requirements for the construction of electrical apparatus for use in hazardous atmospheres are specified, for example, in BS 5501 (EN 50014 to EN 50020, EN 50028 and EN 50039) and BS 4683. Compliance with accepted standards is demonstrated by the production of a certificate from a certification body, of which there are a number of competent ones, but not all of which have recognition by UK Petroleum Licensing Authorities.

The recognized authority in the United Kingdom for the certification and approval of electrical equipment for use in hazardous areas (non-mining) for the issuing of certificates of conformity with the EEC Directive 76/117/EEC is:

BASEEFA

Health and Safety Executive

Harpur Hill

Buxton, Derbyshire SK17 9JN

There are EEC-recognized national certification authorities in other countries.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 29 and a back cover.

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Sidelining in this document indicates the most recent changes by amendment.

Introduction

The vapours given off by liquid fuels dispensed at filling stations are flammable. If ignited they may burn with considerable explosive force when mixed with air in appropriate proportions. Therefore sources of ignition should be excluded wherever possible from hazardous areas where vapour may be present. Electrical equipment, whether portable or fixed, used in such areas and in the vicinity of metering pumps should be constructed so as not to be a source of ignition of flammable vapour. It is important that such equipment is correctly designed, selected, installed, used and maintained and does not facilitate the perpetration of fraud.

1 Scope

This Part of BS 7117 specifies requirements for metering pumps and dispensers to be installed at filling stations and used to dispense liquid fuels into the tanks of motor vehicles, boats and light aircraft and into portable containers. It gives particular attention to electrical, mechanical and hydraulic equipment and electrical apparatus installed within, or mounted on, the housings of metering pumps or dispensers.

It does not include any requirements for metering performance such as those specified under the Weights and Measures Legislation.

Except where specifically mentioned, the requirements in this Part apply to apparatus suitable for use and storage at ambient temperatures between $-20\text{ }^{\circ}\text{C}$ and $+40\text{ }^{\circ}\text{C}$ inclusive, unless otherwise marked.

This Part applies to equipment for fuels which are flammable liquids having a flash point not exceeding $100\text{ }^{\circ}\text{C}$, but does not include equipment for liquefied petroleum gas.

This Part does not deal with any hazards related to the dispensing of liquid fuel other than those arising from the ignition of flammable liquids/vapour.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 7117 the definitions given in BS 4727, BS 5501, BS 6941 and BS 5345 (published in a number of Parts) apply, together with the following. For convenience some definitions have been reproduced from those standards.

2.1

air and/or vapour separator

a device which allows air or vapour to escape to a vent pipe from the liquid stream before the liquid reaches the measuring unit (meter)

2.2

computer

a device which receives data from the measuring unit and processes it into volume (and, if required, price) units

2.3

degree of protection by enclosures

the measures applied to the enclosures of electrical apparatus to ensure:

- a) the protection of persons against contact with live or moving parts inside the enclosure and protection of the apparatus against ingress of solid foreign bodies;
- b) the protection of the apparatus against ingress of liquids.

[Reproduced from BS 5501-1:1977 (EN 50014).]

2.4

delivery hose

a flexible delivery pipe

2.5

delivery unit/equipment

the delivery pipework from the outlet of the measuring unit, the dispensing hose and the delivery control nozzle

NOTE It may also incorporate arrangements for supporting the dispensing hose, nozzle, nozzle housing and dispensing controls.

2.6

dispenser

a measuring system similar to a metering pump except that it does not incorporate its own pumping system

2.7

dispersed unit delivery system

a measuring system similar to a metering pump except that the units may be separated and located in individual protective housings

2.8

electrical system

all the electrical and electronic apparatus (including cables and wiring) contained within or mounted on the housing or housings

2.9

explosive atmosphere

a mixture with air, under atmospheric conditions, of flammable substances in the form of gas, vapour or mist, in such proportions that it can be exploded by excessive temperature, arcs or sparks

[Reproduced from BS 5501-1:1977 (EN 50014).]

2.10

filling station

an establishment providing the dispensing of liquid fuels into the fuel tanks of motor vehicles, boats and light aircraft and into portable containers

2.11

hazardous area

an area in which explosive atmospheres are, or may be expected to be, present in quantities such as to require special precautions for the construction and use of electrical apparatus

(Reproduced from BS 5345-1:1989)

NOTE See clause 4.

2.12

indicator unit

a unit which displays the results of measurement transferred to it from the computer

2.13

measuring unit (meter)

a device for measuring the amount of fuel dispensed

NOTE The unit can be coupled directly to a mechanical computer and/or an indicating unit, or the measurement data can be transmitted to a computer (remotely mounted or otherwise).

2.14

non-hazardous area

an area in which explosive atmospheres are not expected to be present in such quantities that special precautions for the construction and use of electrical apparatus are necessary

(Reproduced from BS 5345-1:1989)

NOTE See also clause 4.

2.15

nozzle break device

a device which is fitted directly to the nozzle inlet and which, upon separation, seals to prevent liquid release from the hose

2.16**type of protection**

the measures applied in the construction of electrical apparatus to prevent ignition of the surrounding explosive atmosphere by such apparatus

[Reproduced from BS 5501-1:1977 (EN 50014).]

2.17**flameproof enclosure “d”**

a type of protection in which the parts which can ignite an explosive atmosphere are placed in an enclosure which can withstand the pressure developed during an internal explosion of an explosive mixture and which prevents the transmission of the explosion to the explosive atmosphere surrounding the enclosure

[Reproduced from BS 5501-5:1977 (EN 50018).]

NOTE This type of protection is indicated by the letter “d”.

2.18**increased safety “e”**

a type of protection by which measures are applied so as to prevent with a higher degree of security the possibility of excessive temperatures and of the occurrence of arcs or sparks in the interior and on the external parts of electrical apparatus which does not produce them in normal service

[Reproduced from BS 5501-6:1977 (EN 50019).]

NOTE This type of protection is indicated by the letter “e”.

2.19**intrinsically safe circuit**

a circuit in which no spark or any thermal effect produced in the test conditions prescribed in BS 5501-7 (which include normal operation and specified fault conditions) is capable of causing ignition of a given explosive atmosphere

[Reproduced from BS 5501-7:1977 (EN 50020).]

2.20**intrinsically safe electrical apparatus**

electrical apparatus in which all the circuits are intrinsically safe

[Reproduced from BS 5501-7:1977 (EN 50020).]

NOTE This type of protection is indicated by the letter “i”.

2.21**pressurized apparatus “p”**

a type of protection by which the entry of a surrounding atmosphere into the enclosure of the electrical apparatus is prevented by maintaining, inside the said enclosure, a protective gas at a higher pressure than that of the surrounding atmosphere. The overpressure is maintained either with or without a continuous flow of the protective gas

[Reproduced from BS 5501-3:1977 (EN 50016).]

2.22**type of protection “N”**

a type of protection applied to electrical apparatus such that, in normal operation, it is not capable of igniting a surrounding explosive atmosphere and a fault capable of causing ignition is not likely to occur (Reproduced from BS 6941:1988.)

NOTE This type of protection is indicated by the letter “N”.

2.23

type of protection powder filling “q”

a type of protection in which the enclosure of electrical apparatus is filled with a material in a finely granulated state so that, in the intended conditions of service, any arc occurring within the enclosure of an electrical apparatus will not ignite the surrounding atmosphere. No ignition shall be caused either by flame or by excessive temperature of the surfaces of the enclosure

[Reproduced from BS 5501-4:1977 (EN 50017).]

NOTE This type of protection is indicated by the letter “q”.

2.24

oil immersion “o”

a type of protection in which the electrical apparatus or parts of the electrical apparatus are immersed in oil in such a way that an explosive atmosphere which may be above the oil or outside the enclosure cannot be ignited

[Reproduced from BS 5501-2:1977 (EN 50015).]

NOTE This type of protection is indicated by the letter “o”.

2.25

type of protection “s”: special protection

a concept that has been adopted to permit the certification of those types of electrical apparatus that, by their nature, do not comply with the constructional or other requirements specified for apparatus with established types of protection, but which, nevertheless, can be shown, where necessary by test, to be suitable for use in hazardous areas in prescribed Zones

(Reproduced from BS 5345-8:1980.)

NOTE This type of protection is indicated by the letter “s”.

2.26

encapsulation “m”

a type of protection in which the parts which could ignite an explosive atmosphere by either sparking or heating are enclosed in a compound in such a way that this explosive atmosphere cannot be ignited

[Reproduced from BS 5501-8:1988 (EN 50028).]

NOTE This type of protection is indicated by the letter “m”.

2.27

pump/dispenser canopy

a housing which contains displays and/or luminaires and/or associated circuitry

2.28

pump/dispenser housing

the housing which provides mechanical protection for the equipment in a metering pump/dispenser

NOTE This housing may contain apparatus other than electrical equipment.

2.29

metering pump

a measuring system designed to dispense liquid fuel. It contains its own pumping system to draw fuel from a supply tank or tanks

2.30

remote pump

an electrically driven suction pump assembly mounted above or adjacent to a supply tank and remote from a dispensing facility

2.31

safe-break device

a device which, upon separation, seals the break with minimal liquid release

2.32**submersible pump**

an electrically driven pump immersed in the liquid fuel in the storage tank

2.33**restricted breathing enclosure**

an enclosure that is designed to restrict the entry of gases

2.34**safety nozzle**

a device for controlling the flow of fuel during a dispensing operation

2.35**suitable for Zone 0**

certified by the Certification Authority for use in Zone 0

2.36**suitable for Zone 1**

certified by the Certification Authority for use in Zone 1

2.37**suitable for Zone 2**

certified by the Certification Authority for use in Zone 2

2.38**vapour barrier**

a sealing system to prevent the flow of fuel vapour between adjacent zones

3 Classification of fuels

Fuels are divided into three classes according to flash point.

- Class I.* Liquids which have a flash point below 21 °C, e.g. petroleum spirit (leaded and unleaded) and petroleum spirit mixtures.
- Class II.* Liquids which have a flash point from 21 °C to 55 °C inclusive, e.g. white spirit, kerosine and paraffin.
- Class III.* Liquids which have a flash point above 55 °C up to and including 100 °C, e.g. diesel fuel.

4 Classification of hazardous areas

The concept of hazardous area classification recognizes the differing degrees of probability with which explosive (flammable) concentrations of flammable gas or vapour may arise in installations in terms of both frequency of occurrence and duration of existence on each occasion.

In a hazardous area three types of zone are recognized.

- Zone 0.* In which an explosive gas-air mixture is continuously present, or is present for long periods.
- Zone 1.* In which an explosive gas-air mixture is likely to occur in normal operation.
- Zone 2.* In which an explosive gas-air mixture is not likely to occur in normal operation, and if it occurs it will exist only for a short time.

All other areas are classed as non-hazardous.

NOTE 1 Further information on hazardous area classification is given in BS 5345-2.

NOTE 2 Examples of the hazardous areas for metering pumps and dispensers, subdivided into appropriate zones, are shown in Figure 1 to Figure 10.