# International Standard 6826

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# Reciprocating internal combustion engines — Fire protection

*Moteurs alternatifs à combustion interne — Protection contre l'incendie*

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## Foreword

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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.



International Standard ISO 6826 was developed by Technical Committee ISO/TC 70, *Internal combustion engines*, and was circulated to the member bodies in December 1980.



It has been approved by the member bodies of the following countries :



| | | |
|---|---|---|
| Australia | India | Norway |
| Austria | Iraq | Romania |
| Belgium | Italy | South Africa, Rep. of |
| China | Japan | Switzerland |
| Czechoslovakia | Korea, Dem. P. Rep. of | United Kingdom |
| Egypt, Arab Rep. of | Korea, Rep. of | USA |
| France | Netherlands | USSR |

The member body of the following country expressed disapproval of the document on technical grounds :

Germany, F. R.



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# Reciprocating internal combustion engines — Fire protection

## 1 Scope

This International Standard establishes additional requirements for reciprocating internal combustion engines to minimize the risk of fire caused by the engine and the components and auxiliaries fitted to it. Where necessary, individual requirements can be given for particular engine applications.

## 2 Field of application

This International Standard covers reciprocating internal combustion engines for land, rail-traction and marine use, excluding engines used to propel road construction and earth-moving machines, agricultural tractors, industrial trucks, road vehicles and aircraft.



## 3 Fire protection features

**3.1** The table gives a list of additional fire protection features for reciprocating internal combustion engines.



**3.2** The use of each additional fire protection feature (given in the table below), and any individual requirements for them, depends upon the engine application as defined by the customer and is determined by agreement between the manufacturer and the customer and/or inspecting, and/or legislative authorities, and/or classification societies specified by the customer. This agreement shall state the item numbers of the protection features of the table.

Examples of the selection of the required fire protection features for particular applications are given in the annex.

## 4 Technical requirements of fire protection features

### 4.1 Protection against leakage from the high-pressure fuel injection-system

**4.1.1** Compression ignition engines shall be provided with means to prevent fuel leaks downstream from the injection pump from dripping or spraying onto high-temperature surfaces, electrical components or into the air intake system.

**4.1.2** Means shall be provided for the detection of these fuel leaks. Where necessary and on agreement between the manufacturer and customer, means shall provided to identify the source of the leak.

### 4.2 Protection against leakage from the high-pressure hydraulic oil system

**4.2.1** These systems shall be provided with protection against oil dripping or spraying onto hot surfaces, electrical components or into the air intake system.

**4.2.2** In these systems, means shall be provided for detection of these leaks.

**4.2.3** Flexible pipes in these systems shall be of a type approved by inspecting and/or legislative authorities and/or classification societies.

| Type number | Protection feature | Relevant sub-clause |
|---|---|---|
| 1 | Protection against leakage from the high-pressure fuel injection system | 4.1 |
| 2 | Protection against leakage from the high-pressure hydraulic oil system | 4.2 |
| 3 | Protection against leakage of low-pressure fuel and of lubricating oil[1)] | 4.3 |
| 4 | Protection of high-temperature surfaces against igniting leaking fuel or lubricating oil | 4.4 |
| 5 | Protection from flame from the engine exhaust | 4.5 |
| 6 | Protection from sparks from the engine exhaust | 4.6 |
| 7 | Protection from high-temperature exhaust gas | 4.7 |
| 8 | Protection from backfire flame from the engine air inlets | 4.8 |
| 9 | Protection from flame and sparks from any other engine apertures | 4.9 |
| 10 | Protection from ignition by electrical components | 4.10 |

1) Low pressure fuel means the fuel upstream of the fuel injection pump.

**4.2.4** These systems shall withstand an adequate proof pressure considering the maximum dynamic system operating pressures.

### 4.3 Protection against leakage of low-pressure fuel and of lubricating oil

**4.3.1** In these systems, means shall be provided to prevent dripping or spraying of leakage onto high-temperature surfaces, electrical components or into the air intake system.

NOTE — Examples of protection against dripping or spraying of leakage are as follows :

a) the avoidance of installation of fuel and lubricating oil pipes in the vicinity of high-temperature surfaces, electrical components or air intakes;

b) the local protection or reinforcement for small fragile oil pipes such as those used for pressure signal transmission;

c) the prevention of accidental self-opening of manually operated drain or vent cocks fitted on pipes and equipment containing flammable liquids.

**4.3.2** Trays of suitable depth shall be installed to contain any possible dripping from filters, pumps and tanks containing fuel oil or lubricating oil.

**4.3.3** All gutterways and trays which may collect flammable liquids shall be provided with suitably-sized drains free from sharp bends and horizontal sections. The liquids collected shall be led to recovery tanks or to a low fire-hazard area. When a recovery tank is used, a means of detecting a high level shall be provided.

### 4.4 Protection of high-temperature surfaces against igniting leaking fuel or lubricating oil

**4.4.1** The exhaust system and all other parts of engines shall be designed, shielded or insulated so that no external surface shall reach a temperature which will ignite leaking fuel, and shall comply with the requirements of inspecting and/or legislative authorities and/or classification societies. All insulation materials shall be protected against possible penetration of fuel or lubricating oil.

### 4.5 Protection from flame from the engine exhaust

**4.5.1** Protection from flame from the engine exhaust will have been accomplished when it is ensured that fire or explosion in the exhaust system will be quenched or will not propagate into a fire-hazard area.

**4.5.2** A means shall be provided to drain flammable liquids from the exhaust system if required to accomplish 4.5.1.

**4.5.3** When agreed upon between the manufacturer and customer, a warning device shall give an alarm if there is a fire in the exhaust system.

### 4.6 Protection from sparks from the engine exhaust

**4.6.1** Protection from sparks from the engine exhaust will have been accomplished when it is ensured that sparks will not propagate out of it.

### 4.7 Protection from high-temperature exhaust gas

**4.7.1** Exhaust gas entering a fire-hazard area shall be cooled down to a temperature which prevents it from becoming an ignition source.

### 4.8 Protection from backfire flame from the engine air inlets

**4.8.1** Backfire flame control of the inlet system including the scavenge system will have been accomplished when it is ensured that a fire or explosion in the induction system will be quenched or will not propagate into a fire-hazard area.

**4.8.2** Means shall be provided to drain flammable liquids from the engine air inlet system.

**4.8.3** When agreed upon between the manufacturer and customer, the engine inlet system shall be fitted with a warning device to give an alarm if there is a fire in the inlet system.

NOTE — An example of backfire flame control is protection obtained by fitting the air intake with a flame arrestor or by ducting it to the open atmosphere.



### 4.9 Protection from flame and sparks from any other engine apertures

**4.9.1** Protection from flame and sparks from any other engine apertures will be accomplished when it is ensured that an internal fire or explosion will be quenched or will not propagate into a fire-hazard area.

NOTE — Examples of apertures and possible protection :

a) crankcase explosion relief valves may be fitted with flame arrestors;

b) cylinder head indicator cocks may be designed to avoid flame emission due to self-opening;

c) crankcase breathers may be fitted with flame arrestors or vapours and gases may be conducted outside the fire-hazard area.

### 4.10 Protection from ignition by electrical components

**4.10.1** Protection from ignition by electrical components will have been accomplished when it is ensured that these components will not ignite a flammable liquid or fuel air mixture surrounding the component by sparks, heat or ignition of a flammable mixture inside the electrical component.

NOTE — Protection of electrical components may be obtained by sealing the components, preventing the passage of flame out of the components, forced ventilation, etc.

# Annex

Examples of the possible selection of protection features for particular engine applications are given below :

| Engine application | Type of protection |
|---|---|
| Stationary diesel engines | 1, 2 |
| Spark ignition engines for boats | 2, 3, 4, 8, 9, 10 |
| Equipment for mining, drilling, etc. | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 |