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Draft Indian Standard

SINGLE CYLINDER FUEL INJECTION PUMPS – SPECIFICATION
(*Second Revision*)

ICS: 43.060.40

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Automotive Primemovers, Transmission Systems and Internal Combustion Engine Sectional Committee, TED 2

FOREWORD

(Formal clause to be added later)

This standard was first published in 1960. During the few years for which this standard had been in use, certain modifications and improvements had been suggested which had necessitated the first revision of this standard. Apart from the editorial improvements, the following were the main modifications:

- a) The word 'element' had been substituted by the word 'component' as it had been made out that the word 'element' when referred to fuel injection pumps has a specific meaning, that is, the combined unit of the barrel and the plunger.
- b) The nomenclature of a few important parts has been added. In Table 1 against alphabetical reference 'd', the word 'BTC' had been replaced by 'bottom dead centre'.
- c) A method of designating the pump for inquiry and order had been included.

In this standard, only those dimensions which are essential for ensuring the interchangeability between fuel pumps of different makes have been specified. The methods for testing the pumps for proper functioning have also been included. In order to allow scope for development and improvement, requirements of materials for the different components and their design details have been left to the manufacturer.

In this Second revision following changes have been incorporated:

- a) Referred standards in the previous version which have been withdrawn are replaced suitably with their latest versions;
- b) Contents of the Amendment issued to the Standards have been suitably incorporated in this draft standard;
- c) BIS Certification Marking clause has been introduced; and
- d) Other editorial changes have been done to bring the standard in the latest style and format of Indian Standards

This standard is intended chiefly to cover the technical provisions relating to single cylinder fuel injection pumps, and it does not include all the necessary provisions of a contract.

The composition of the Committee responsible for the formulation of this standard is given in Annex A **(Will be added later)**.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2: 2022 'Rules for rounding off numerical values (*second*

revision)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Draft Indian Standard

SINGLE CYLINDER FUEL INJECTION PUMPS – SPECIFICATION
(*Second Revision*)

1 SCOPE

1.1 This standard covers the requirements for three types of single cylinder, constant stroke, and fuel injection plunger pumps without integral camshafts.

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards.

<i>IS No</i>	<i>Title</i>
IS 4218 (Part 1): 2001/ISO 68-1	ISO general purpose metric screw threads: Part 1 basic profile (<i>Second revision</i>)
IS 1460: 2017	Automotive diesel fuel - Specification (<i>Sixth revision</i>)

3 TYPES OF FUEL INJECTION PUMPS

3.1 The pumps covered in this standard have been classified into three types, depending upon the length of a stroke, as follows:

Type	Nominal Length of Stroke (mm)
A	8
B	10
C	15

4 NOMENCLATURE

4.1 The nomenclature used for the different components of a single cylinder fuel injection pump has been given in Fig. 1 to 3.

5 DIMENSIONS

5.1 The dimensions of fuel injection pumps of Types A, B and C shall be as given in Table 1 and Fig. 4.

5.2 The dimensions for threads for inlet and outlet shall conform to those specified in IS 4218 (Part 1).

6 DESIGNATION

6.1 The designation of a fuel injection pump shall indicate:

- a) Commonly used name;
- b) Type;
- c) Plunger diameter;
- d) The number of this standard; and
- e) Any other information such as inspection windows for Type B and Type C only.

Example:

A single cylinder fuel injection pump of Type A, having plunger diameter 6 mm shall be designated as:

Single Cylinder Fuel Injection Pump A6 IS 1543

7 GENERAL REQUIREMENTS

7.1 The fuel injection pumps shall be of robust construction incorporating the highest quality material and workmanship in accordance with the best trade practice.

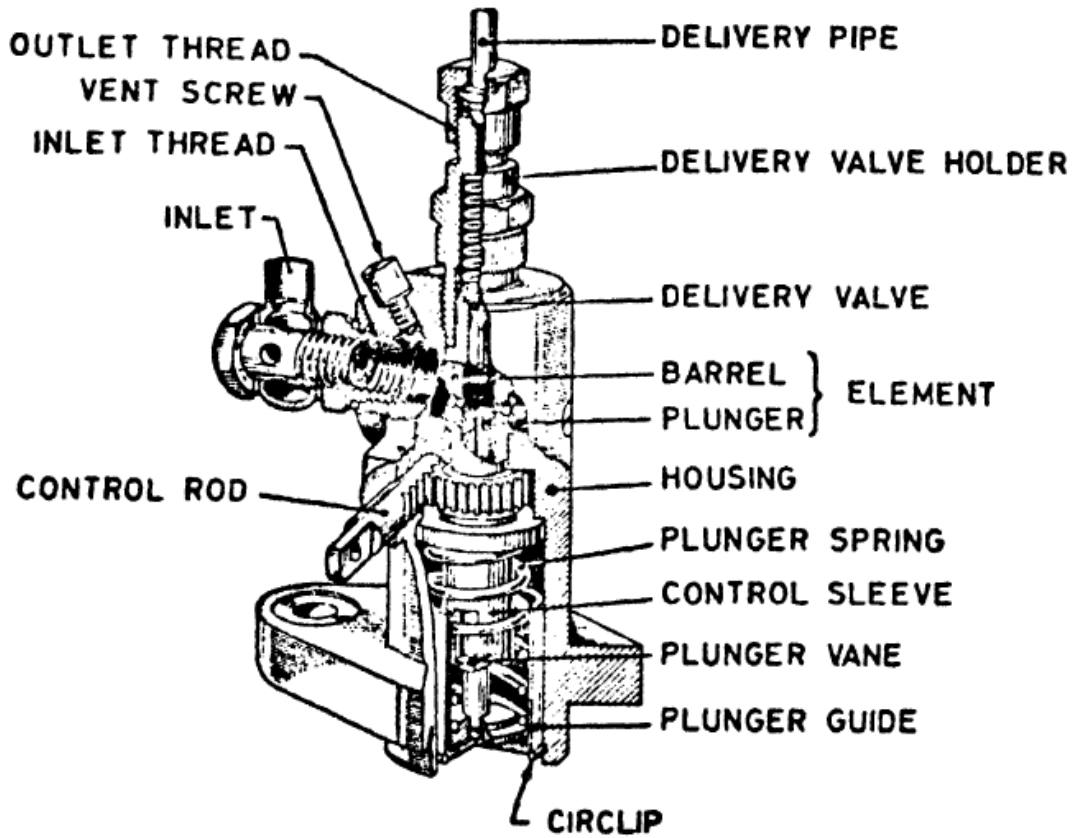


Fig.1 A Typical Sectional View of Pump

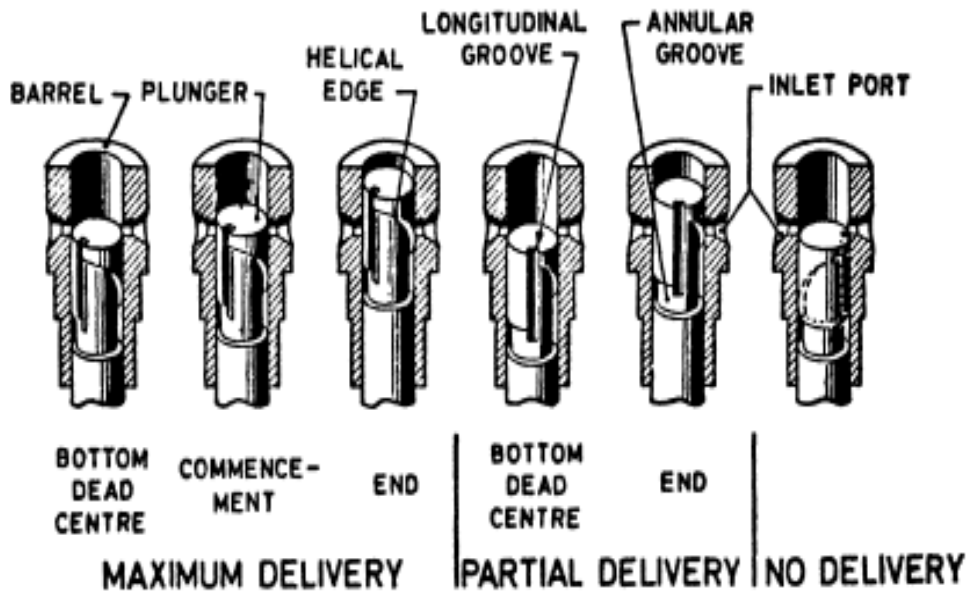


Fig.2 A Typical Sectional View of Pump Element

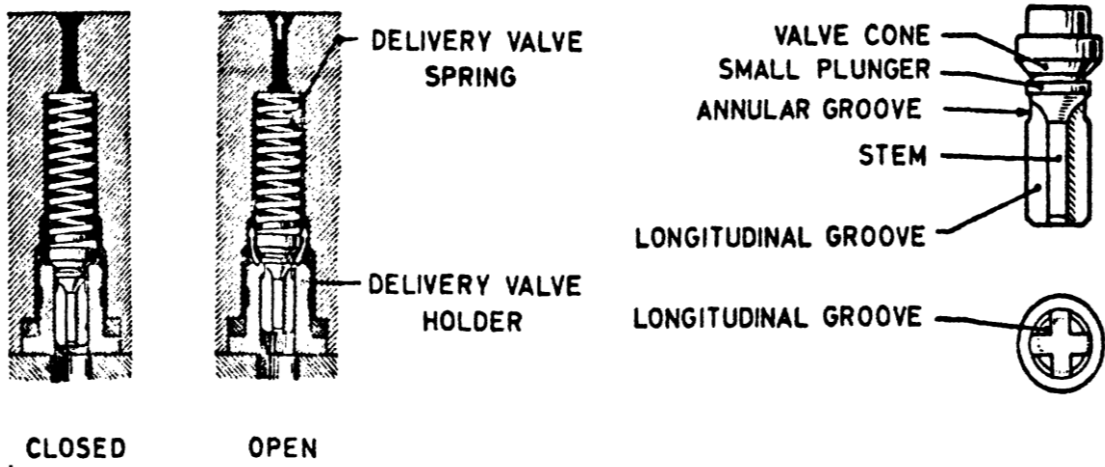


Fig.3 Delivery Valve (A Typical Section)

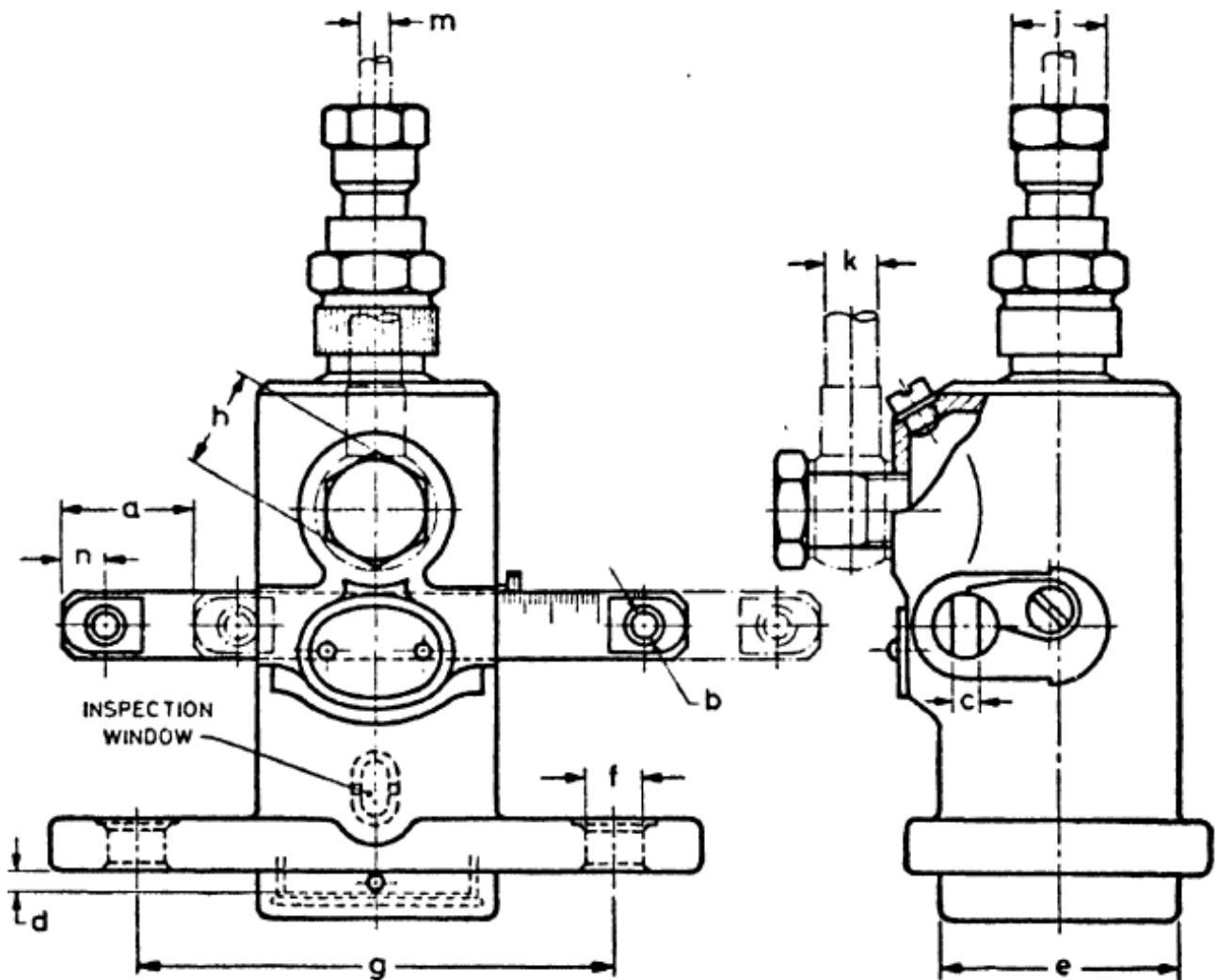


Fig.4 Dimensions of Fuel Injection pump

NOTE — For single cylinder pumps used on single cylinder engines, marking on the rack is optional. Whenever, a single cylinder pump is used for multi - cylinder engines, the marking on the rack is compulsory.

7.2 Vent Screws and Inspection Windows

Vent screws and inspection windows are optional and may be provided subject to agreement between the purchaser and the manufacturer.

7.3 Control Rod

The control rod shall be graduated in millimetres to indicate its travel. It shall also be marked to indicate conspicuously 'no-injection' position as 'O' and the maximum travel position 'a', as given in Table 1 and Fig. 4 where special application requires, other types of control rods may be provided.

7.3.1 The control rod shall move freely and the force required to move it from 'no-injection' position to the ' maximum travel ' position shall not exceed the following limits when tested at the speeds given:

Type of Pump	Plunger Strokes per Minute	Force Required to Move Control Rod in Gram Force
A	0	80
	1 000	40
	0	400
B	600	100
	0	2000
C	400	600
	8	

TABLE 1 DIMENSIONS OF FUEL INJECTION PUMPS
(Clause 5.1 and 7.3 and Fig. 4)

ALPHABETICAL REFERENCE IN FIG. 4 (1)	PARTICULARS (2)	DIMENSIONS FOR		
		Type A (3) mm	Type B (4) mm	Type C (5) mm
—	Pitch of plunger helix	15, 14	20	40
—	Plunger diameter	5, 6, 7, 8 & 9	5,6 , 7,8,9 , 10 & 11	10, 11, 12, 13, & 14,15, 16, 17 & 18
—	Inlet threads	M14 × 1.5	M14 × 1.5	M 18 × 1.5
—	Outlet threads	M12 × 1.5	M14 × 1.5	M 18 × 1.5
a	Control rod travel	21	25	36
b	Diameter of connecting hole in control rod (Optional)	$5.00^{+0.04}_0$	$5.00^{+0.04}_0$	$6.00^{+0.04}_0$
c	Thickness of control rod connecting end	$5.00^{+0}_{-0.1}$	$5.00^{+0}_{-0.1}$	$6.00^{+0}_{-0.1}$
d	Distance between flange seating and bottom dead centre of plunger guide after mounting	3.02 ± 0.4	9.70 ± 0.5	5.50 ± 0.5
e	Mounting sleeve diameter	$35.00^{+0}_{0.10}$	$45.00^{+0}_{0.10}$	$65.00^{+0}_{0.15}$

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f	Diameter of mounting holes	8.5	11.0 ¹⁾	18.0
g	Distance between centres of mounting holes	60.00 ± 0.1	90.00 ± 0.1	112.00 ± 0.1
h	Width across flats of the hexagon of the inlet pipe connection	19.00 ⁺⁰ _{0.15}	19.00 ⁺⁰ _{0.15}	24.00 ⁺⁰ _{0.15}
j	Width across flats of the hexagon of the outlet pipe connection	17.00 + 0	19.00 + 0	22.00 + 0
k	Inlet pipe outside diameter (nominal)	0.15	0.15	0.15
m	Outlet pipe outside diameter (nominal)	6	8	8
n	Distance from the centre line of hole in the control rod to the end of control rod	6	8, 7.5	8
NOTE — ¹⁾ Indicates that it shall be permissible to use a 12 mm hole instead, during the period of transition.				

7.4 The different components shall be assembled and held in position in the fuel pump housing by a circlip mounted in a conveniently removable position to facilitate dismantling.

8 TEST

8.1 Sampling

The sampling and criteria for conformity shall be as agreed upon between the purchaser and the supplier.

8.2 Test Oil

Any light and chemically inert oil having a viscosity corresponding to Grade A of IS 1460.

8.3 Test for Tightness against Fuel Inlet Pressure

The fuel injection pump shall be submerged in the test oil (*see 8.2*) maintained at 50°C and an air pressure of 1 kgf/cm² shall be applied at the fuel oil inlet. There shall be no leakage of air from any part of the pump.

NOTE — In actual service, the ambient temperature may, at times, exceed 50°C and hence the pumps should be so designed as to be reasonably free from leakage at temperatures higher than even 50°C.

8.4 Test for Tightness against Injection Pressure

The fuel injection pump, when operated with test oil (*see 8.2*) at 50°C against the nozzle release pressure as given below, shall not show any leakage between delivery valve holder and pump body:

Type of Pump	Nozzle Release Pressure kgf/cm ²
A	175
B	175
C	300

8.5 Discharge Characteristics — Unless otherwise agreed upon between the manufacturer and the purchaser, the test shall be carried out under the following conditions:

Sl. No.	CHARACTERISTIC	TYPE OF PUMP		
		A	B	C
(1)	Strokes per minute	1000	600	400
(2)	Control rod position in mm (distance from 'O' position)	18	18	33
(3)	Inlet pressure in kgf/cm ²	0.5	0.5	0.5
(4)	Nozzle release pressure in kgf/cm ²	175	175	300
(5)	Delivery pipe length in mm	600	600	500
(6)	Oil temperature °C	50	50	50

8.5.1 Pump Discharge

The permissible variation from the stated value of fuel discharge shall be subject to agreement between the manufacturer and the purchaser, but this shall not vary from the stated value by more than the following:

Type of Pump	Permissible Variation from the Stated Value of Discharge, Percent
A	± 10
B	± 6
C	± 4

9 MARKING

9.1 Each fuel injection pumps shall be fitted with a name-plate giving:

- a) The name of manufacturer or trade-mark;
- b) Manufacturer's serial number or other marking which will enable identification of the pump; and

- c) Type and plunger diameter.

9.2 BIS Certification Marking

Each fuel injection pumps may also be marked with the Standard Mark.

9.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations made thereunder. The details of conditions under which the license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

10 PACKING

10.1 Each pump shall be filled and operated a few times with good preservative oil, and completely drained leaving a thin film of preservative. The open orifices shall be suitably sealed against the ingress of foreign matter. Outside surfaces shall be painted. The pumps shall be wrapped in accordance with the best trade practice to ensure that there is no deterioration under reasonably good storage conditions.

Annex A
(Foreword)

COMMITTEE COMPOSITION

**AUTOMOTIVE PRIME MOVERS, TRANSMISSION SYSTEM AND
INTERNAL COMBUSTION ENGINES SECTIONAL COMMITTEE, TED 2**

Will be added later