INTERNATIONAL STANDARD ISO 4093

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Road vehicles — Fuel injection pumps — High pressure pipes for testing

Véhicules routiers — Pompes d'injection — Tuyauteries haute pression pour essais

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

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 4093 was developed by Technical Committee ISO/TC 22, *Road vehicles*, and was circulated to the member bodies in February 1977.

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

Austria	Japan	Sweden
Belgium	Korea, Rep. of	Switzerland
Brazil	Mexico	Turkey
Czechoslovakia	New Zealand	United Kingdom
France	Poland	U.S.A.
Germany	Romania	U.S.S.R.
India	South Africa, Rep. of	Yugoslavia
Italy	Spain	

No member body expressed disapproval of the document.

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Road vehicles — Fuel injection pumps — High pressure pipes for testing

1 SCOPE

This International Standard specifies the functional requirements of a range of high pressure pipes for use on benches for the testing and setting of fuel injection pumps intended for compression ignition engines.

Only dimensions and requirements affecting the hydraulic characteristics of the pipes are defined. Other requirements such as the type of the end connections or shape of the pipes when bent are not included, as these depend on the connections provided on the pump outlets and injector inlets and on the design features of individual pumps and test benches.

2 FIELD OF APPLICATION

The range of pipes specified is to enable the pump and engine manufacturer to choose a suitable type of pipe for pump deliveries up to 300 mm^3/stroke/cylinder. The particular pipe to be used shall be identified by the pump manufacturer in the test schedule for each individual pump type and application.

3 REFERENCES

ISO 2974, *Road vehicles — High pressure pipe fittings with 60° female cone.*

ISO 4008, *Road vehicles — Fuel injection pumps — Conditions for testing.*

ISO 4010, *Road vehicles — Calibrating nozzle, delay pintle type.*

4 DESIGNATION OF HIGH PRESSURE PIPES

The pipes shall preferably be identified by a tag or clip, for example "ISO 4093.1".

5 DIMENSIONS

The six types of pipe shown in the table are standardized.

TABLE — **Dimensions of high pressure pipes**

Dimensions in millimetres

ISO identification	Internal diameter	External diameter	Length
1	2 ± 0,025	6	600 ± 5
2	2 ± 0,025	6	845 ± 5
3	3 ± 0,025	6	600 ± 5
4	3 ± 0,025	6	1 000 ± 5
5	3 ± 0,025	8	750 ± 5
6	3 ± 0,025	8	1 000 ± 5

NOTE — If pipes of dimensions other than those specified in the table are required to be used for special technical reasons, the dimensions of such non-standard pipes shall be clearly specified in the pump test schedule.

6 GENERAL REQUIREMENTS

6.1 The pipes may be of any ferrous material, usually cold-drawn mild steel, and shall have a smooth internal bore, free from cracks or other structural weaknesses and from corrosion or other matter likely to cause damage to the fuel injection system.

6.2 After making the end connections, any closing-in of the pipe shall be removed by inserting a reamer of the nominal internal diameter of the pipe to a depth at least twice that of the length of the deformed end of the pipe. Any closing-in of the ends after extended use shall also be eliminated in a similar manner.

6.3 The radius of any bend subsequently made in fabricating the pipes shall be not less than 16 mm for 6 mm pipes, and not less than 25 mm for 8 mm pipes, measured from the centre line of the pipe.

6.4 Pipes shall be washed out internally after the making of ends and bending in order to remove extraneous matter.

For storage, the ends shall be closed off from ingress of air in order to avoid internal corrosion.