

INTERNATIONAL STANDARD

ISO 4093

Third edition
1999-11-15

Diesel engines — Fuel injection pumps — High-pressure pipes for testing

*Moteurs diesels — Pompes d'injection de combustible — Tuyauteries
haute pression pour essais*

STANDARDSISO.COM : Click to view the full PDF of ISO 4093:1999



Reference number
ISO 4093:1999(E)

© ISO 1999

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

STANDARDSISO.COM : Click to view the full PDF of ISO 4093:1999

© ISO 1999

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 734 10 79
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 4093 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 7, *Injection equipment and filters for use on road vehicles*.

This third edition cancels and replaces the second edition (ISO 4093:1986), which has been technically revised.

STANDARDSISO.COM : Click to view the full PDF of ISO 4093:1999

Diesel engines — 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 diesel engines.

Only dimensions and requirements affecting the hydraulic characteristics of the pipes are specified. Other requirements, such as the type of 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.

This International Standard applies to a range of pipes to enable the pump engine manufacturer to choose a suitable type of pipe for pump deliveries up to 300 mm³/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.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, this publication do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 8535-1, *Compression-ignition engines — Steel tubes for high-pressure fuel injection pipes — Part 1: Requirements for seamless cold-drawn single-wall tubes.*

3 Dimensions

The thirteen types of pipe specified in Table 1 form a range of standardized high-pressure pipes for testing.

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

Table 1 — Dimensions of high-pressure pipes for testing

Dimensions in millimetres

ISO designation	Internal diameter ± 0,025	External diameter	Length ± 5	Recommended bend radius min.
ISO 4093-1	2	6	600	16
ISO 4093-2	2	6	845	16
ISO 4093-3	3	6	600	25
ISO 4093-4	3	6	1 000	25
ISO 4093-5	3	8	750	50
ISO 4093-6	3	8	1 000	50
ISO 4093-7	4	8	1 000	50
ISO 4093-8	4	8	1 500	50
ISO 4093-9	2	6	450	16
ISO 4093-10	3	8	600	50
ISO 4093-11	1,5	6	710	16
ISO 4093-12	1,6	6	350	16
ISO 4093-13	1,8	6	450	16

4 General requirements

4.1 The high-pressure pipes for testing shall be made from steel tubes as specified in ISO 8535-1; they 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.

4.2 After making the connection ends, 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 to the length of the deformed end (connection end) of the pipe. Any closing-in of the connection ends after extended use shall also be similarly removed.

4.3 The radius of any bend subsequently made in manufacturing the pipes shall be not less than that recommended in the table measured from the centreline of the pipe.

4.4 Pipes shall be washed internally after the making of connection ends and bending, in order to remove extraneous matter.

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

5 Designation of high-pressure pipes

Pipes should preferably be identified by a tag or clip citing the ISO designation in accordance with the table, for example.