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Gasoline engines with direct fuel injection (GDI engines) — Installation of the high pressure fuel pump to the engine

Moteur à essence à injection directe (moteurs GDI) — Installation de la pompe d'injection de carburant à haute pression sur le moteur

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 34, *Propulsion, powertrain, and powertrain fluids*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The motor vehicle industry is increasingly being pressured by the world's regulators to improve fuel consumption whilst reducing exhaust emissions (particularly CO_2 emissions). The challenge for automotive engineers is to balance the trade-offs between the technology to improve fuel consumption and that to reduce regulated emissions.

The most promising new engine technology of late is the direct injection spark ignition engine [also known as the gasoline direct injection (GDI) engine]. Listed amongst the advantages of GDI are a significantly improved fuel economy and corresponding lower CO_2 emissions than on comparable gasoline engines.

With this technology comes new fuel system components and new interfaces with the engine. One component of the GDI fuel system is the high pressure fuel pump that supplies fuel to the common rail. This high pressure fuel pump is usually driven by a separate cam lobe on the engine camshaft and thus has to be integrated into the engine housing.

This document provides design engineers with best practices (dimensional requirements) for the assembly of the GDI fuel pump into the engine.

GDI fuel systems typically operate in a pressure range of around 35 MPa and are labelled “high pressure”. In the context of all injections systems, including diesel, this same pressure range is considered as medium pressure, as diesel injection operates at much higher pressures. Thus, the term “high pressure” in this document, and “medium pressure” in the ISO 18418 series, refer to the same pressure range for the same purpose.

Gasoline engines with direct fuel injection (GDI engines) — Installation of the high pressure fuel pump to the engine

1 Scope

This document specifies dimensions required for the installation and integration of the high pressure fuel pump in gasoline (GDI) engines. The location of the fuel connections and the dimensions of the pump outside shape are not defined since they vary according to the manufacturer of the pump and to the particular application.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2974, *Diesel engines — 60° female cones for high-pressure fuel injection components*

ISO 13948-2:2016, *Diesel engines — Fuel injection pumps and fuel injector low-pressure connections — Part 2: Non-threaded (push-on) connections*

ISO 18418-1, *Gasoline engines — Medium pressure liquid fuel supply connections — Part 1: 60° female cone connectors*

SAE J2044, *Quick Connect Coupling Specification for Liquid Fuel and Vapour/Emissions Systems*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

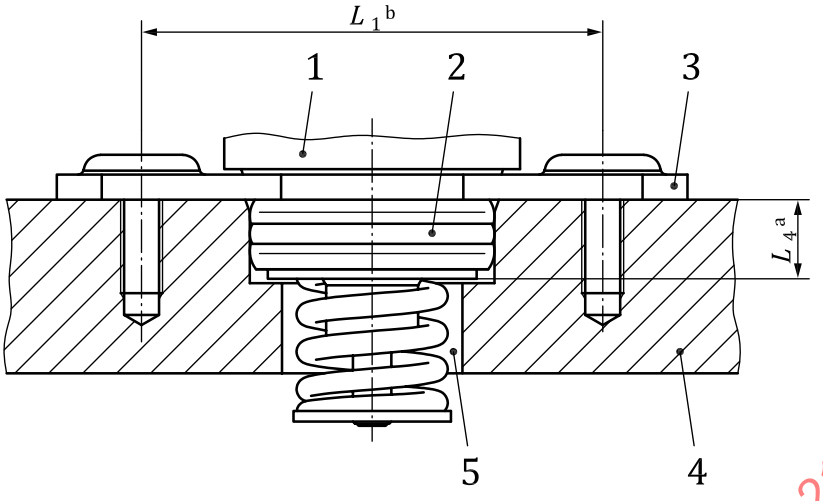
No terms and definitions are listed in this document

4 Dimensions and tolerances

4.1 General

The high pressure pump on gasoline engines with direct fuel injection is usually integrated into the cylinder head of the engine and its plunger or its tappet is driven by a separate cam lobe on the engine cam shaft. This document describes the interface dimensions (flange dimensions) at the cylinder head.

4.2 High pressure pump interface



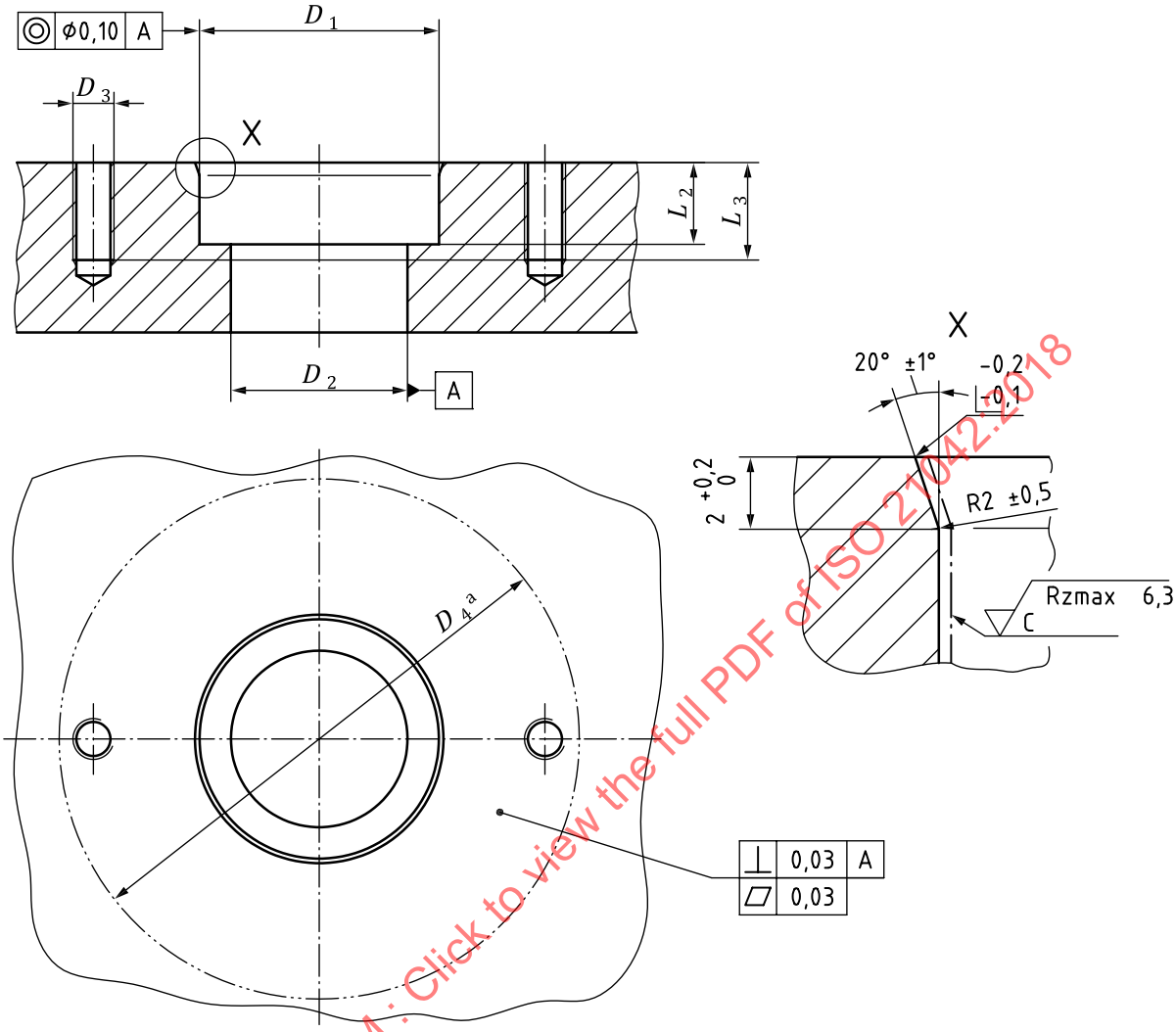
Key

L_1 pitch of mounting bolts
L_4 pump intrusion or height of high pressure pump (lower housing)
1 high pressure pump housing
2 sealing ring
3 flange for mounting
4 engine housing, e.g. cylinder head
5 guiding cylinder for tappet
a $L_4 < L_2$ (see Figure 2 and Table 1).
b Details see Table 1.

Figure 1 — Principle of installation

Figure 1 shows the major components and the principle of the installation of the high pressure pump to the engine.

Dimensions in millimetres



a D_4 depends on the design of the high pressure pump and shall be determined by the pump supplier and the engine manufacturer.

Figure 2 — Installation flange at the engine

Figure 2 shows the necessary flange dimension at the engine.

Table 1 — Main dimensions for assembly

Dimensions in millimetres

Key	Items	Preferred	Optional
D1	Bore Dia. 1	35H7	—
D2	Bore Dia. 2	32H7	26H7
D3	Bolt size	M8	M6
L_1	Pitch of mounting bolts	66	75; 73; 69; 60
L_2	Bore depth of D1	12 min.	13 min.
L_3	Effective screw depth	Minimum value for screw force shall be agreed upon between supplier and engine manufacturer	Min. 15 mm with note to suit material quality and bolt size

Table 1 specifies the dimensions of the flange in the engine