

# Bosch fuel filters – because quality matters

Fuel filters developed and manufactured in Aranjuez, Spain, carry out a series of strict original-equipment examinations

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Connecting the plastic filter lid with a closed pleated-star by infrared welding

Modern gasoline direct injection systems work with high fuel pressures. Depending on the system, this can be up to 350 bar. Since contaminants can impair or interrupt the fuel supply, it is important to monitor the fuel specifically to keep it clean. This is ensured by a fuel filter integrated in the fuel supply module. This cleans the fuel over the entire lifespan of the vehicle and removes reliably finest particles. Bosch meets these high requirements and ensures the performance of the filters through various tests. Numerous vehicle manufacturers use Bosch fuel supply modules with built-in fuel filters as original equipment.

### Compliance with manufacturer specifications

Vehicle manufacturers have different requirements. However, the same applies to all of them: the fuel filters integrated into the fuel supply module must not be designed as wearing parts but as “lifetime products”. At an interval of, for example, 80,000 km, a “normal” filter has absorbed so many particles that it should be changed. A “lifetime filter”, which always has to work within the specified differential-pressure range, absorbs around three times that amount over the vehicle’s lifetime. Various laboratory tests ensure that the filters can achieve this. Among other things, the filtration performance and the dust retention capacity are tested. The test conditions are precisely defined and can be reproduced at any time. This applies, for example, to the test

liquids used and the ambient temperature. The test particles used are Arizona test dust, which corresponds in composition and fineness to the test standards SAE J726 or ISO 12103-1.

### High resilience of the filter media

Cellulose-based filter papers are used as the basis for filter production. These media are impregnated with a special resin that makes them particularly mechanically, thermally and chemically resilient. Depending on the application, an additional layer of fine plastic fibers is applied in a complex process. This enables even higher separation levels. When processing the filters, the quality standards of the original equipment are very high.



The fuel supply module is an integrated in-tank unit and contains all the components to deliver fuel to the engine.



Measurement of the maximum pore size (DIN ISO 2942)

The filters must be sealed on the inside so that no unfiltered fuel can get into the injection system. Therefore, special attention is paid to the stable connection of the end folds of the filter medium during production. In addition, the connection between the filter element and the end caps ensures internal tightness and stability of the filter. To create these connections, special welding processes are used.

#### **Large production quantities and extensive controls**

Bosch in Aranjuez produces over 14 million filters per year. These include high runners but also many special references that are produced in smaller quantities. As part of product and process development, a design and process FMEA (Failure Mode and Effects Analysis) is carried out. Potential problems or errors are identified and corrected – before any impact on the system or process occurs. Quality tests are defined and carried out on this basis.

These include, for example, 100% height control or automatic inspection of the filter media with vision cameras.

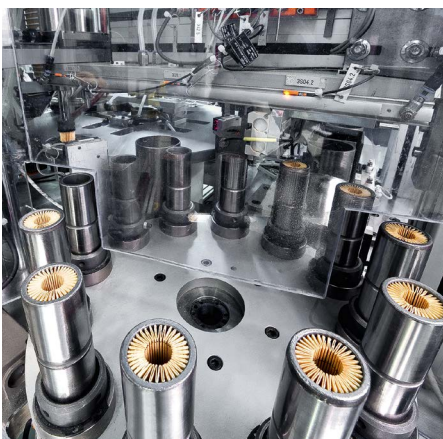
#### **Reliability test plan for all filter families**

Filtration performance, mechanical resilience, cleanliness, aging and many other properties are assessed as part of reliability tests. As with the market launch of new products, these are carried out according to reliability test plans based on the technical specifications provided by the customer in PPM (parts per million).

#### **Testing of the raw material**

Almost all of the plastic parts required to assemble the filters are manufactured in-house. This means there is transparency between the various batches and the corresponding tests carried out in the quality laboratories. During the design phase, the development department defines the most suitable material based on the specifications. Externally purchased filter media are internally tested for quality by the purchasing department – for example by measuring the maximum pore size according to DIN ISO 2942 – for each batch before the production is released.

## High quality filter media from Aranjuez also for diesel engines



Denoxtronic filter production line



#### **Denoxtronic filter: The power of paper**

Denoxtronic filters clean the AdBlue®, which may contain particles that can clog or damage the injector valve. This protects the injection valve and ensures that the AdBlue® is dosed precisely. The right filter medium is crucial for the optimal function of the Denoxtronic filter.



Denoxtronic filter with special tool