

## F01N

**GAS-FLOW SILENCERS OR EXHAUST APPARATUS FOR MACHINES OR ENGINES IN GENERAL; GAS-FLOW SILENCERS OR EXHAUST APPARATUS FOR INTERNAL COMBUSTION ENGINES** ({evacuation of fumes from the area where they are produced [B08B 15/00](#); arrangement of exhaust or silencing apparatus on percussive tools [B25D 17/12](#)} ; arrangements in connection with gas exhaust of propulsion units in vehicles [B60K 13/00](#), {on ships or other waterborne vessels [B63H 21/32](#), on aircraft [B64D 33/04](#); arrangement of exhaust or silencing apparatus on firearms [F41A 21/30](#); ground installations for reducing aircraft engine or jet noise [B64F 1/26](#); silencers specially adapted for steam engines [F01B 31/16](#); air-intake silencers for gas turbine or jet propulsion plants [F02C 7/045](#); jet pipe or nozzles for jet propulsion plants [F02K](#)} ; combustion-air intake silencers specially adapted for, or arranged on, internal-combustion engines [F02M 35/00](#); {combating noise or silencing in positive displacement machines or pumps [F04B 39/0027](#), in rotary-piston machines or pumps [F04C 29/06](#), in non-positive displacement pumps [F04D 29/66](#); means in valves for absorbing noise [F16K 47/02](#); noise absorbers in pipe system [F16L 55/02](#); conducting smoke or fumes from various locations to the outside [F23J 11/00](#); means for preventing or suppressing noise in air-conditioning or ventilation systems [F24F 13/24](#)} ; protecting against, or damping, noise in general [G10K 11/16](#))

### Definition statement

*This place covers:*

Silencing apparatus in exhaust systems for reducing the noise emitted by mainly internal combustion engines.

Exhaust or silencing apparatus having means for purifying, rendering innocuous, or otherwise treating exhaust. Here the main apparatus are particulate filters, absorbents and other catalytic reactors. The means can also be merely an electric discharge or

the addition of air or liquids.

Exhaust or silencing apparatus combined or associated with devices profiting by exhaust energy, mainly the devices using exhaust heat.

Electrical control, monitoring or diagnostic of exhaust gas treating apparatus.

Other constructional features common to the above apparatus or the exhaust conduits including manufacture, assembly, disassembly or material selection.

### Relationships with other classification places

Filters having details, such that they can also be used in fields other than internal combustion engines should be classified in [B01D 46/00](#) as well. A similar relationship exists with [B01D 53/00](#) regarding catalysts, see the next section for more details.

When the regeneration of a filter or catalyst is done only by modifying engine parameters, e.g. injection time delay, exhaust/intake valve timing, the document should be classified in [F02D 41/02](#) instead. When it is not specified how the regeneration is performed, the document should be classified both in [F01N](#) as well as in [F02D 41/02](#).

Relationships with other classification places

Regarding the arrangement of reducing agent tanks, (mainly urea), in the vehicle, this arrangement should be classified in [B60K 15/00](#) as well as in [F01N](#).

General details of exhaust pipe couplings or flexible exhaust pipes should always be classified by [F16L](#) as well as in [F01N](#).

The treatment of recirculated exhaust gases (EGR) should be classified only in the [F02M 26/00](#), unless the exhaust purifier also treats exhaust which is not recirculated.

## References

### Limiting references

*This place does not cover:*

Filters in general	<a href="#">B01D 46/00</a>
Catalytic processes in general	<a href="#">B01D 53/00</a>
Fluid mixers	<a href="#">B01F 25/00</a>
Catalysts in general structures	<a href="#">B01J 35/00</a>
Electrostatic filters in general	<a href="#">B03C 3/00</a>
Deforming, enlarging pipes	<a href="#">B21D 41/00</a>
Spinning of metal housings	<a href="#">B21D 51/16</a>
Vehicle, mounting around heat sources, e.g. exhaust pipes	<a href="#">B60R 13/08</a>
Marine outboard exhaust outlets	<a href="#">B63H 20/24</a>
Honeycomb details: Ceramic compositions; Ceramic structures	<a href="#">C04B 35/00</a> , <a href="#">C04B 38/00</a>
Street cleaning vehicles	<a href="#">E01H 1/08</a>
Crankcase ventilation	<a href="#">F01M 13/04</a>
Diagnosing (malfunction) of sensors	<a href="#">F02D 41/22</a>
Treating recirculated exhaust gases	<a href="#">F02M 26/00</a>
Intake filters for combustion air	<a href="#">F02M 35/024</a>
Fuel burners in general	<a href="#">F23D 11/00</a>
Catalytic treatment of flue gases from furnaces burning coal, gas or oil	<a href="#">F23J 15/00</a>
Catalytic treatment of gases from exhaust from gas turbines	<a href="#">F23R 3/40</a>
Heat exchangers in general	<a href="#">F28D 1/00</a>
Devices measuring pressure in (exhaust) passages	<a href="#">G01L 23/24</a>
Preparing an exhaust gas to send and test a filter or a catalyst	<a href="#">G01N 1/00</a>
Sampling from an exhaust stream	<a href="#">G01N 1/2252</a>
Sensors measuring clogging by electric resistance	<a href="#">G01N 27/04</a>
Electric discharge devices in general	<a href="#">H05H 1/24</a>

### Special rules of classification

Although not compulsory in many cases the classification of additional information, e.g. the type of catalyst, is very useful for retrieving the document. For example:

If the document discloses mainly the arrangement for the supply of a reducing means, covered in detail under [F01N 2610/00](#) - [F01N 2610/14](#) to an exhaust purifier, but the specific type of exhaust

purifier is not clearly defined. For example, it can be a particulate filter or a SCR catalyst, then an entry should be given for both type of devices.

**Glossary of terms**

*In this place, the following terms or expressions are used with the meaning indicated:*

Absorbent	Could also be found under the wording: trap, adsorbent or storage device, e.g. NOx-trap. It is an element which can absorb at least one compound and release/adsorb it again. The reduction or oxidation of the compound in the absorbent may or may not occur, depending of the presence of a suitable catalyst therefore.
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**Synonyms and Keywords**

*In patent documents, the following abbreviations are often used:*

SCR	Selective catalytic reduction
DPF	Diesel particulate filter
CRT	Continuous regenerating trap
Absorbent	Trap, adsorber, absorber, occlusion element; Speicher
Silencer	Muffler

**F01N 1/00**

**Silencing apparatus characterised by method of silencing {(by cooling [F01N 3/02](#); using liquids [F01N 3/04](#))}**

**Definition statement**

*This place covers:*

All types of silencing apparatus for reducing or controlling the noise in exhaust emitted by internal combustion engines. The silencing apparatus are divided mainly in two types: resonance and throttling. Under resonance the definition is that the exhaust gas does not flow through the resonator chamber or pipe, only the sound waves do. Most common resonators are Helmholtz chambers and 1/4 wave pipes. On the other hand under throttling the definition is that the exhaust gas has to flow through the throttling chamber or pipe. Most common throttling method is using an expansion chamber. Note that nowadays both types can be combined together in a single silencer. Further silencing effect is achieved adding a sound absorbing material to the chambers or pipes.

Some samples of subgroups

[F01N 1/081](#) - by passing the gases through a mass of particles



[F01N 1/082](#) - the gases passing through porous members

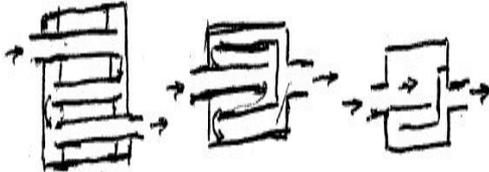


Definition statement

[F01N 1/083](#) - using transversal baffles defining a tortuous path for the gases or successively throttling gas flow



[F01N 1/084](#) - the gases flowing through the silencer two or more times longitudinally in opposite directions, e.g. using parallel or concentric tubes



[F01N 1/085](#) - using a central core throttling gas passage



[F01N 1/086](#) - having means to impart whirling motion to the gases



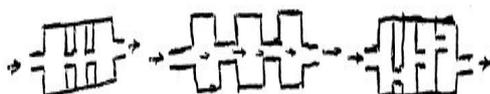
[F01N 1/087](#) - using tangential inlets into a circular chamber



[F01N 1/088](#) - using vanes arranged on gas flow path or gas flow tubes with tangentially directed apertures



[F01N 1/089](#) - using two or more expansion chambers in series

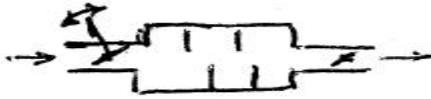


[F01N 1/16](#)

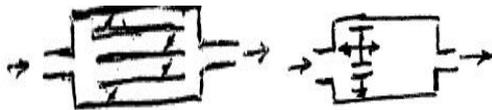
Movable parts are provided for regulation purposes, this is the place to classify them. The only exception are the exhaust brakes, which are classified in [F02D 9/00](#) and subgroups. Examples of the subgroups under [F01N 1/16](#):

Definition statement

[F01N 1/165](#) - for adjusting flow area, e.g. by means of a valve



[F01N 1/166](#) - for changing gas flow path through the silencer or for adjusting the dimensions of a chamber or a pipe



## References

### Limiting references

*This place does not cover:*

Silencers in vacuum cleaners	<a href="#">A47L 9/0081</a>
Arrangement of exhaust or silencing apparatus on percussive tools	<a href="#">B25D 17/12</a>
Arrangements in connection with gas exhaust of propulsion units:-in vehicles	<a href="#">B60K 13/00</a>
Amplifying noise for the vehicle's passengers	<a href="#">B60Q 5/00</a>
Mounting around noise sources, e.g. blowers	<a href="#">B60R 13/0884</a>
Silencer devices for power brake systems	<a href="#">B60T 17/008</a>
-on ships or other waterborne vessels:	<a href="#">B63H 21/32</a>
-on aircraft:	<a href="#">B64D 33/04</a>
Ground installations for reducing aircraft engine or jet noise	<a href="#">B64F 1/26</a>
Silencers specially adapted for steam engines	<a href="#">F01B 31/16.</a>
Acoustic insulation of combustion engines	<a href="#">F02B 77/13</a>
Air-intake silencers for gas turbine or jet propulsion plants	<a href="#">F02C 7/045</a>
Jet pipe or nozzles for jet propulsion plants	<a href="#">F02K</a>
Combustion-air intake silencers, e.g. a gas flow resonator, specially adapted for, or arranged on, internal-combustion engines	<a href="#">F02M 35/00</a>
Silencers for: -positive displacement machines or pumps	<a href="#">F04B 39/0027</a>
-rotary-piston machines or pumps	<a href="#">F04C 29/06</a>
Non-positive displacement pumps	<a href="#">F04D 29/66</a>
Means in valves for absorbing noise systems	<a href="#">F16K 47/02</a>
Noise absorbers in pipes or pipe systems	<a href="#">F16L 55/02</a>
Means for preventing or suppressing noise in air-conditioning or ventilation systems	<a href="#">F24F 13/24</a>
Arrangement of exhaust or silencing apparatus on firearms	<a href="#">F41A 21/30</a>
Protecting against or damping noise in general; masking sound	<a href="#">G10K 11/00</a>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Using kinetic or wave energy of charge in induction systems, or of combustion residues in exhaust systems, for improving quantity of charge or for increasing removal of combustion residues, in exhaust systems only, e.g. for sucking-off combustion gases, the systems having variable, i.e. adjustable, cross-sectional areas, chambers of variable volume, or like variable means is classified	<a href="#">F02B 27/04</a> , <a href="#">F02B 27/06</a> .
Details of exhaust or intake valves	<a href="#">F02D 9/08</a>

### Special rules of classification

The most active subgroups in [F01N 1/00](#) are the resonance [F01N 1/02](#) - [F01N 1/04](#) and the throttling or whirling [F01N 1/08](#) - [F01N 1/125](#). Resonance is achieved by placing a chamber or a channel which although in communication with the exhaust flow, the exhaust does not flow through the resonance chamber or channel. Nowadays most silencers have a combination of the above two types of silencing methods. In this latter case, such a document is classified in both subgroups.

Some documents do not mention the term resonance or tuning for a dead chamber. These documents are classified either in [F01N 1/003](#) or in [F01N 1/24](#).

Combination of silencers with catalysts in a single housing [F01N 3/2885](#);

Combination of silencers with filters in a single housing [F01N 3/0335](#);

Combination of silencers with other devices, should be in [F01N 2230/00](#).

It is mandatory that the remaining details of the silencers, must be classified in the following codes:

[F01N 2210/00](#) until [F01N 2210/06](#) for the combination of silencing methods;

[F01N 2230/00](#) until [F01N 2230/08](#) for the combination of silencers and other devices; [F01N 2290/00](#) until [F01N 2290/10](#) for movable parts or members in exhaust systems for other than for control purposes;

[F01N 2470/00](#) until [F01N 2470/30](#) for the structure or shape of gas passages, pipes or tubes;  
[F01N 2490/00](#) till [F01N 2490/20](#) for the structure, disposition or shape of gas-chambers;  
[F01N 2310/00](#) until [F01N 2310/14](#) or [F01N 2450/06](#) for the filling of chambers with sound absorbing material;

[F01N 2590/00](#) till [F01N 2590/08](#) for the particular use, that is, the type of vehicle or machine.

## F01N 3/00

**Exhaust or silencing apparatus having means for purifying, rendering innocuous, or otherwise treating exhaust (electric control [F01N 9/00](#); monitoring or diagnostic devices for exhaust-gas treatment apparatus [F01N 11/00](#) {; collecting or removing exhaust gases of vehicle engines in workshops [B08B 15/00](#), on highways [E01C 1/005](#)}}**

### Definition statement

*This place covers:*

Exhaust or silencing apparatus having means for purifying, rendering innocuous, or otherwise treating exhaust. Here one can find mainly apparatus as particulate filters, absorbents and other catalytic reactors. Their arrangement or particular sequence in the exhaust line can be found here.

## Definition statement

The means for purifying can also be merely an electric discharge or the addition of air for cooling or heating. The means can also be the addition of liquids for treating the exhaust gases without any catalyst reactor.

The systems of adding fuel or reducing agent to the exhaust are also classified here.

## References

### Limiting references

*This place does not cover:*

Treating EGR, i.e. recirculated exhaust gases	<a href="#">F02M 26/00</a>
Catalytic treatment of flue gases from furnaces burning coal, gas or oil	<a href="#">F23J 15/00</a>
Catalytic treatment of gases from exhaust from gas turbines	<a href="#">F23R 3/40</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Evaporators	<a href="#">B01B 1/00</a>
Filters in general	<a href="#">B01D 24/00</a> - <a href="#">B01D 46/00</a>
Catalytic processes in general	<a href="#">B01D 53/00</a>
Catalyst substrate or layer manufacture (not housing)	<a href="#">B01J 35/00</a>
Magnetic or electrostatic separation of solid material from solid materials or fluids; separation by high-voltage electric fields:	<a href="#">B03C</a>
Layered products, more than one layer (mounting mats)	<a href="#">B32B</a>
Additive tanks for fuel	<a href="#">B60K 15/00</a>
Hydrogen production	<a href="#">C01B 3/02</a>
Ammonia production	<a href="#">C01C 1/08</a>
Ceramic fibers, alumina, mullite	<a href="#">C04B 35/00</a>
Non-woven fabric, fleece	<a href="#">D04H 1/00</a>
Pulp, paper	<a href="#">D21H 13/00</a>
Engine cooling systems	<a href="#">F01P</a>
Exhaust gas recirculation	<a href="#">F02M 26/00</a>
Engine intake systems	<a href="#">F02M 35/00</a>
Fuel burners	<a href="#">F23D 11/00</a>
Water heaters, serpentines	<a href="#">F24H 1/00</a>
Control of level in tanks	<a href="#">G01F 23/00</a>
Verifying (urea) quality, refractometers	<a href="#">G01N 21/4133</a>
Ohmic resistance heaters	<a href="#">H05B 3/06</a>

## Special rules of classification

Documents concerning mainly material details of ceramic honeycombs should be classified in [C04B 35/00](#) or [C04B 38/00](#), a code [F01N 3/0222](#) is given to this type of documents.

Chemical or biological purification of engine exhaust gases: [B01D 53/92](#). Catalysts, in general, characterised by their form or physical properties: [B01J 35/00](#).

When the regeneration is done only by modifying engine parameters, e.g. injection time delay, exhaust/intake valve timing, the document should be classified in [F02D 41/02](#). The class [F01N 3/023](#) should not be given in this case.

Regeneration or desulfurization of the absorbent is done only by modifying engine parameters, the document should be classified in [F02D 41/0275](#).

Regarding insulation mats for particulate filters or catalyst housings, note that

complex machining procedures therefore should be sent to [B21D](#). Complex details of the mat material, e.g. ceramic fiber type are in [C04B 35/00](#), non woven fabric and needle punching are in [D04H 1/00](#). In these latter cases the codes [F01N 3/2842](#) - [F01N 3/2871](#) should be given instead.

Regarding details of arrangements for supplying fuel or reducing agent. Tanks containing reducing agent should also be classified in [B60K 15/00](#) when there are important details about the position of reducing agent tank in relation to parts of the vehicle structure or in relation to the main fuel tank.

General heating pipes are in [F16L 53/30](#); Electrically conducting hoses in [F16L 11/127](#); General ohmic resistance heating hoses in [H05B 3/58](#); Coupling devices in [H01R 13/00](#).

When classifying in the bypass groups [F01N 3/031](#), [F01N 3/032](#), [F01N 3/0878](#), [F01N 3/2053](#) the more detailed bypass codes [F01N 2410/00](#) till [F01N 2410/14](#) should be given as well.

### **Further details of subgroups**

#### [F01N 3/01](#)

This subgroup handles devices physically separating particles, while [F01N 3/0892](#) - Electric or magnetic treatment - concerns devices changing the gas structure at molecular level.

#### [F01N 3/021](#)

Combination of filter with a catalyst [F01N 3/035](#), when the catalyst is coated then in [F01N 2510/06](#). Except when disclosed that the catalyst is used to produce NO<sub>2</sub> upstream of the filter (CRT), then it should be classified in [F01N 3/0231](#). Be aware that many documents of this type are in still in [F01N 3/035](#). Combination of filter with an absorbent should be in [F01N 3/0821](#), preferably when in the same housing or coated on the filter.

#### [F01N 3/022](#)

This subgroup should be given as well as the more detailed Indexing Code [F01N 2330/00](#) till [F01N 2330/60](#) - structure of catalyst support or particle filter.

#### [F01N 3/0222](#)

Detailed features of honeycombs, such as partition walls and special geometry is classified in [F01N 2330/30](#) till [F01N 2330/60](#), these documents should also be classified in [B01D 46/2403](#) which has a deeper index.

#### [F01N 3/023](#) - [F01N 3/032](#)

These subgroups should be given in combination with [F01N 9/002](#) every time that the document concerns the control of the filter regeneration. If the document shows several means to regenerate the filter, without going into detail in any of them, they should be classified as additional information.

#### [F01N 3/035](#)

For catalysed diesel particulate filters, not to be used for catalytic coatings applied on filters to lower soot ignition temperature or otherwise promote soot ignition. Instead, use [F01N 3/023](#) and [F01N 2510/065](#). When catalyst oxidizes NO<sub>x</sub> to NO<sub>2</sub> then [F01N 3/0231](#).

#### [F01N 3/04](#)

## Special rules of classification

Using liquids without chemical reactions directly involved, mostly water. Therefore reducing means and fuel are not classified here as explained further. Other provisions for cooling see [F01N 2260/024](#).

[F01N 3/05](#)

Using air without chemical reactions directly involved. Not for the arrangements for the supply of additional air for the thermal or catalytic conversion of noxious components of exhaust which should be in [F01N 3/30](#) and subgroups; the control of additional air [F01N 3/22](#). Mixing exhaust with air in tailpipes [F01N 13/082](#). Other provisions for cooling see [F01N 2260/022](#).

[F01N 3/0807](#)

Using absorbents or adsorbents, while the substance to be eliminated after being absorbed is classified in [F01N 3/0828](#).

[F01N 3/0814](#) is to be used for devices where substances intended to be eliminated, e.g. NO<sub>x</sub>, are being absorbed and catalytically treated. Not to be used for the, e.g. temporary, trapping of other substances, e.g. oxygen or ammonia, during the course of elimination of the intended substance(s). These other substances should be codified using [F01N 2570/00](#) codes.

Arrangements for adding fuel to absorbent are classified in [F01N 3/36](#) and under [F01N 2610/00](#) - [F01N 2610/14](#)

[F01N 3/0871](#)

Is used for the control of the regeneration of the absorbent, e.g. for releasing stored NO<sub>x</sub>. While desulfurization of NO<sub>x</sub> traps is classified in [F01N 3/0885](#)

The remaining control details are classified under the subgroups of [F01N 2900/00](#).

[F01N 3/0892](#)

Electric or magnetic treatment, e.g. dissociation of noxious components. Mostly by corona discharge. Note that, electric filters are in [F01N 3/01](#); regeneration of exhaust filters [F01N 3/023](#); heating catalytic converters is in [F01N 3/2006](#).

[F01N 3/206](#)

Mainly adding substances to exhaust gases for promoting purification, e.g. catalytic material in liquid form other than NO<sub>x</sub> reducing agents, see [F01N 3/2066](#) for Selective Catalytic Reduction.

A reclassification work is being performed and still contains documents that should be in [F01N 3/2066](#). Not to be used for adding fuel to the exhaust gases to promote heating up of catalyst, e.g. at cold start. Herefore use [F01N 3/2033](#).

[F01N 3/2066](#)

## Selective Catalytic Reduction

Not complete, reclassification work is being performed, some documents are still classified under [F01N 3/206](#). In [F01N 3/2073](#) the

means for generating a reducing substance from the exhaust gases is normally a NO<sub>x</sub> absorbent/reducing catalyst. An ammonia generator is classified in [F01N 2240/25](#). When the control of the dosing of the reducing agent is relevant the subgroup [F01N 3/208](#) is given, where the remaining control details are classified under [F01N 2900/00](#).

Details of arrangements for supplying substances other than fuel, like ammonia or urea are also classified here. Under arrangements is to be understood: pumps, valves, conduits, nozzles, injectors. These details are classified in more detail under [F01N 2610/00](#) - [F01N 2610/14](#).

[F01N 3/22](#)

Control of additional air supply, as this is a control group, the remaining control details are classified under [F01N 2900/00](#)

[F01N 3/26](#)

Construction of thermal reactors, old technology for afterburning of exhaust gases, normally without using a catalyst. Supply of fuel to these reactors only is also included in this group.

[F01N 3/28](#)

Construction of catalytic reactors, all other details not covered by any of the subgroups of [F01N 3/28](#) are classified in this group, e.g. radial flow or a tapered catalyst carrier.

The following codes should be given when possible in combination with this subgroup:  
[F01N 2330/00](#) till [F01N 2330/60](#), [F01N 2350/00](#) - [F01N 2350/08](#), [F01N 2370/00](#) - [F01N 2370/40](#),  
[F01N 2450/00](#) - [F01N 2450/40](#) or [F01N 2510/00](#) till [F01N 2510/14](#).

When a mat can be used either in filter or a catalyst between the monolithic body and housing it is classified in [F01N 3/2842](#) till [F01N 3/2853](#) and not in [F01N 3/0211](#). In [F01N 3/2842](#) till [F01N 3/2853](#) are to be found mats having a special shape or arrangement in the honeycomb housing. Simple methods of fitting the honeycomb in the housing should be in [F01N 2350/02](#),

[F01N 3/36](#)

Details of arrangements for supplying fuel, like pumps, tanks, valves, conduits, nozzles, injectors, should be classified here as well. These details are classified in more detail under [F01N 2610/00](#) till [F01N 2610/14](#).

## **F01N 5/00**

**Exhaust or silencing apparatus combined or associated with devices profiting by exhaust energy (using kinetic or wave energy of exhaust gases in exhaust systems for charging [F02B](#))**

### **Definition statement**

*This place covers:*

Exhaust or silencing apparatus combined or associated with devices profiting by exhaust energy;  
Use of the heat of exhaust gases to heat a fluid for other vehicle purposes; to generate electricity in a thermoelectric device.

### **References**

#### **Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

Heat exchangers	<a href="#">F01N 3/2889</a> , <a href="#">F01N 2240/02</a> , <a href="#">F01N 3/0205</a>
Exhaust driven turbines which are coupled to electrical generators	<a href="#">F01N 5/04</a>
Devices using wave or kinetic energy for charging the engine	<a href="#">F02B 27/04</a>
Turbocharging	<a href="#">F02B 37/00</a>
Turbo-compound (Nutz turbine)	<a href="#">F02B 41/10</a>
Use of exhaust heat in steam turbines	<a href="#">F02G 5/02</a> .

Thermoelectric devices in general	<a href="#">H10N 10/00</a>
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## F01N 9/00

**Electrical control of exhaust gas treating apparatus (monitoring or diagnostic devices for exhaust-gas treatment apparatus [F01N 11/00](#); conjoint electrical control of two or more combustion engine functions [F02D 43/00](#))**

### Definition statement

*This place covers:*

Methods of controlling exhaust gas treating apparatus. Under [F01N 9/00](#) is classified the control of devices not provided elsewhere.

SCR control is already in [F01N 3/208](#) and the control of the exhaust side regeneration of a filter is already in [F01N 9/002](#).

Examples of other apparatus or devices are NO<sub>x</sub> absorbers, oxidation catalysts, an exhaust heater or a bypass valve [also give the respective bypass symbol, e.g. [F01N 3/2053](#) or [F01N 3/0878](#)].

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

When control is the main issue as well for the regeneration of a particulate filter	<a href="#">F01N 3/00</a> , <a href="#">F01N 3/0871</a> , <a href="#">F01N 3/208</a> , <a href="#">F01N 3/2006</a> , <a href="#">F01N 3/22</a>
Monitoring or diagnostic devices for exhaust-gas treatment apparatus	<a href="#">F01N 11/00</a>
Details of the control method	<a href="#">F01N 2900/00</a>
Electrical control of supply of combustible mixture or its constituents in relation with the state of the exhaust gas treating apparatus	<a href="#">F02D 41/0235</a>
Conjoint electrical control of two or more combustion engine functions	<a href="#">F02D 43/00</a>

## F01N 11/00

**Monitoring or diagnostic devices for exhaust-gas treatment apparatus {, e.g. for catalytic activity (safety, indicating or supervising devices for internal combustion engines [F02B 77/08](#); testing of machines [G01M 13/00](#))}**

### Definition statement

*This place covers:*

Monitoring or diagnostic devices for exhaust-gas treatment apparatus, e.g. for catalytic activity; Only the monitoring and diagnosing. Diagnosis is meant when no changes are introduced in the exhaust apparatus or to the flow, instead an alarm or warning is given or an interruption of a control routine is performed, e.g. a regeneration that is stopped as a consequence of the diagnosis.

## References

### Limiting references

*This place does not cover:*

Monitoring and diagnosing a (defect) exhaust gas sensor	<a href="#">F02D 41/22</a>
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### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Safety, indicating or supervising devices for internal combustion engines	<a href="#">F02B 77/08</a>
Testing of machines	<a href="#">G01M 13/00</a>

## Special rules of classification

It can happen that a document is classified in both groups, when an apparatus or an exhaust gas property is monitored and the results are used to introduce complex changes in the control routine of the exhaust apparatus or to the exhaust flow.

When classifying in the [F01N 11/00](#) group, when appropriate, the codes [F01N 2550/00](#) - [F01N 2550/22](#) should be given, to classify the type of apparatus or device being diagnosed.

## F01N 13/00

**Exhaust or silencing apparatus characterised by constructional features  
{; Exhaust or silencing apparatus, or parts thereof, having pertinent characteristics not provided for in, or of interest apart from, groups  
[F01N 1/00](#) - [F01N 5/00](#), [F01N 9/00](#), [F01N 11/00](#)}**

### Definition statement

*This place covers:*

Joints and assembling details of exhaust parts inside a housing or between exhaust conduits. Selection of particular materials, thermal insulation details, special arrangement of the exhaust conduits or devices on the vehicle or engine. Exhaust manifolds. Exhaust details of engines adapted for particular uses, model applications, marine propulsion.

## References

### Limiting references

*This place does not cover:*

Sealings in general	<a href="#">F16J 15/00</a>
Pipes, pipes joints in general	<a href="#">F16L</a>

### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Handling exhaust gas in outboard drives	<a href="#">B63H 20/24</a>
Pipe joints, flanges and flexible pipes	<a href="#">F16L</a>

## Special rules of classification

### Further details of subgroups

Regarding [F01N 13/001](#), passages inside the cylinder head should be classified in [F02F 1/00](#) and not in this subclass.

Regarding [F01N 13/008](#) the construction details of a sensor itself are in [G01N](#). Sensor arrangements in the exhaust of combustion engines, e.g. for temperature, misfire, air/fuel ratio, oxygen sensors: [F02B 77/086](#).

Regarding [F01N 13/007](#), the intake silencers are in [F02M 35/12](#) and silencing methods are to be classified also using [F01N 1/00](#) and below.

Regarding [F01N 13/14](#) other thermal insulation: mats or gaskets between catalyst or filter and housing, [F01N 3/2839](#) or [F01N 3/0211](#); Thermal or acoustic insulation of combustion engines: [F02B 77/11](#); Insulating elements, e.g. for sound or heat insulation, for vehicles [B60R 13/08](#) and below; for mounting around heat sources, e.g. exhaust pipes: [B60R 13/0876](#); Heat shields for motor vehicles: [B62D 25/2072](#); Thermal insulation in general: [F16L 59/00](#); Means for preventing radiation, e.g. with metal foil: [F16L 59/08](#); Arrangements for the insulation of pipes or pipe systems: [F16L 59/14](#) and below.

[F01N 13/002](#), here are mostly uses not covered by the more detailed [F01N 2590/00](#) and below. With the exception of some portable devices, like chainsaws that are still remaining in [F01N 13/002](#).

[F01N 13/004](#), this subgroup goes parallel with [F01N 13/12](#), submerged exhausting. Treating exhaust by using liquids: [F01N 3/04](#).

[F01N 13/008](#), to describe type of sensor use [F01N 2560/00](#) and subcodes. Fitting exhaust sensors, add [F01N 2450/10](#),

[F01N 13/02](#) and [F01N 13/04](#) are for silencers only other apparatus, like filters, absorbents and catalysts are in [F01N 13/02](#) - [F01N 13/04](#).

[F01N 13/08](#), pipe details, curvature, deformation, special position of pipe in relation to a vehicle part, further details should be also classified in [F01N 2470/00](#) and below.

[F01N 13/082](#), this subgroup crosses sometimes with the subgroup [F01N 13/20](#). However [F01N 13/20](#) should be used only for the bell-shaped or flared outlet shape. The rest should be classified here in [F01N 13/082](#). In case of doubt some documents were classified in both groups.

[F01N 13/12](#), see above reference to [F01N 13/004](#).

[F01N 13/16](#), more specific material should be classified in [F01N 2530/00](#) and below.

[F01N 13/1805](#) connections of exhaust manifolds, exhaust pipes or pipe sections outside of the housing of a silencer or purifier, should be classified here, in contrast with [F01N 13/1838](#).

[F01N 13/1838](#), here are the connections regarding the inside of the housing of a silencer or purifier. That is the connection between housing and tubes, tubes and baffles, in contrast with [F01N 13/1805](#), see above.

[F01N 13/20](#), see above references to [F01N 13/082](#).