# F22G

## SUPERHEATING OF STEAM (steam separating arrangements in boilers F22B37/26 )

## Definition statement

*This subclass/group covers:*

This subclass covers general aspects of, or methods for, generating superheated steam. Methods of steam superheating characterised by the form of heating method and by location, arrangement and disposition, constructional features of steam superheaters, control systems for controlling superheat temperature and all component parts or details of steam superheaters are covered. Thereby this subclass is limited in only methods of, or apparatus for, the generation of superheated steam for heating or power purposes.

## Relationship between large subject matter areas

Methods of steam generation and steam boilers are classified in F22B, economisers and all aspect concerning feed water supply and circulation of feed water in boilers are classified in F22D, engine plants where engine aspects predominate are classified in F01K, domestic central heating systems using steam are classified in F24D, heat exchange or heat transfer in general is classified in F28 and the generation of vapour in cores of nuclear reactors is classified in G21.

## Informative references

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

| | |
|---|---|
| Steam accumulators specially adapted for superheated steam | F01K 1/10 |
| Plants having heaters one heater being a fired superheater | F01K 3/183 |
| Plants with steam conversion | F01K 3/002 |
| Plants having heaters with heating by live steam for superheating or reheating | F01K 3/265 |
| Boilers heated electrically | F22B 1/28 |
| Boilers of once-through type built-up from tubes receiving water at one end and delivering superheated steam at the other end of the tubes | F22B 29/06 |

| | |
|---|---|
| Boilers with separate combustion apparatus for the boiler and the superheater respectively | F22B 31/04 |
| Central heating systems operating with superheated steam | F24D 1/06 |
| Compression machines, plants or systems with non-reversible cycles comprising superheaters | F25B 40/06 |
| Nuclear moderator wherein one zone is a superheating zone | G21C 5/22 |
| Reactors with engines with the engine working fluid superheated by the reactor coolant | G21D 5/14 |
| Reactors with engines with the engine working fluid superheated by a separate heat source | G21D 5/14 |

## Special rules of classification within this subclass

Attention is drawn to the definition of superheated "steam" and superheated "vapour". In cases where a specific entry for vapour is missing, documents related to special superheated vapours are classified in groups where only superheated "steam" is explicitly mentioned.

## Glossary of terms

*In this subclass/group, the following terms (or expressions) are used with the meaning indicated:*

| | |
|---|---|
| Desuperheater | Reduction of superheated steam temperature |
| Attemperator | Reduction of superheated steam temperature by bringing superheated steam into direct contact with water or steam or mixtures thereof. |
| Steam conditioners | Reduction of superheated steam to the needed temperature |

# F22G 1/00

## Steam superheating characterised by heating method (exothermal chemical reactions not involving a supply of free oxygen gas, apparatus or devices for using the heat therefrom F24J)

## Definition statement

*This subclass/group covers:*

Superheaters and methods of generation of superheated steam characterised by the heating method, such as the heat being supplied by steam, by hot flue gases from a furnace or a steam boiler, by radiation, by chemical radiation or by a separate heat source independent from heat supply of the steam boiler, including electrically heated superheaters. Furthermore methods of creating superheated steam by throttling such as reducing the pressure or direct superheaters such as devices and methods for mixing steam with furnace gases or other combustion products are classified in this main group

## Relationship between large subject matter areas

Methods of steam generation, where there is not mentioned, that the generated steam is superheated and characterised by form of heating method are classified in F22B 1/00.

## Informative references

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

| | |
|---|---|
| Plants with steam as working fluid created by combustion of hydrogen with oxygen | F01K 25/005 |
| Steam production by combustion of hydrogen with oxygen | F22B 1/003 |
| Steam separating arrangements with separator reheaters | F22B 37/266 |
| Plants characterised by the use of steam or heat accumulators with steam conversion | F01K 3/002 |
| Steam boilers of furnace-tube type | F22B 7/00 |
| Steam boilers heated electrically | F22B 1/28 |
| Plants characterised by the use of | F01K 3/188 |

| | |
|---|---|
| steam or heat accumulators having heaters using heat from a specified chemical reaction | |
| Plants characterised by the use of steam or heat accumulators having heaters using nuclear heat with a fired superheater | F01K 3/183 |
| Steam engine plants using mixtures of steam gas (direct evaporator or superheater) | F01K 21/047 |
| Controlling superheat temperature with water injection in combination with steam pressure reducing valves | F22G 5/126 |

## Special rules of classification within this group

When superheated steam is created only by the exothermic combustion of oxygen and hydrogen, then the groups F22B 1/003 and F01K 25/005 should also be considered.

# F22G 3/00

## Steam superheaters characterised by constructional features; Details of component parts thereof (general aspects of enclosed heat-exchangers F28D)

## Definition statement

*This subclass/group covers:*

Constructional features and details of component parts of steam superheaters such as steam tube arrangements, superheater drain arrangements, steam tubes with steam flowing in opposite direction in one pipe, annular steam tubes, steam superheaters with heating tubes, headers and collectors of superheaters. Furthermore arrangements for the protection of superheater elements and connecting or sealing of superheater tubes are covered.

## Relationship between large subject matter areas

Component parts or details of steam boilers are classified in F22B 37/00, which contains much more entries than F22G 3/00.

## Informative references

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

| | |
|---|---|
| Details and accessories of water tubes in steam boilers | F22B 37/10 |
| Steam superheaters characterised by their location | F22G 7/00 |
| Water tube boiler built-up from sets of spaced double-walled water tubes of return type | F22B 23/00 |
| Water tube boiler built-up from sets of tubes with internally-arranged flue tubes (annular steam tubes) | F22B 25/00 |
| Drums, headers and accessories therefor | F22B 37/22 |
| Arrangements on drums or collectors for fixing tubes or for connecting collectors to each other | F22B 37/225 |

# F22G 5/00

## Controlling superheat temperature (control systems for steam boilers F22B; regulating or controlling in general G05)

### Definition statement

*This subclass/group covers:*

Methods and devices for controlling superheat steam by regulating flue gas flow, by circulating flue gases, by displacing superheater sections, by attemperating the superheated steam (i. e. spraying water into steam), by indirectly cooling or heating the superheated steam in auxiliary enclosed heat-exchangers, by by-passing steam around superheater sections. Furthermore applications of combustion-control devices and combined control procedures for controlling superheat temperature are covered.

### Relationship between large subject matter areas

Control of steam boilers in general are covered by the group F22B 35/00

### Informative references

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

| | |
|---|---|
| Spray mixers | B01F 5/18 |
| Plants characterised by the use of steam or heat accumulators with steam conversion | F01K 3/002 |
| Control of steam boilers by flue gas dampers | F22B 35/001 |
| Control of steam boilers by circulating flue gases | F22B 35/002 |
| Control of steam boilers by injecting water | F22B 35/104 |
| Control systems of steam boilers with auxiliary heating surfaces | F22B 35/107 |
| Steam superheating with the heat being supplied by steam | F22G 1/005 |
| Steam superheating with provisions for superheating by throttling (pressure reduction) | F22G 1/10 |

## F22G 7/00

### Steam superheaters characterised by location, arrangement, or disposition

### Definition statement

*This subclass/group covers:*

Steam superheaters, which are characterised by their location, arrangement or disposition, like superheaters being located in locomotive boilers, in fire tubes, in jackets around fire tubes, in furnace tubes, in fire boxes, in smoke boxes, in flues or in water-tube boilers.

### Relationship between large subject matter areas

Methods of steam generation and steam boilers are classified in F22B

### Informative references

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

| | |
|---|---|
| Steam locomotives | F01K 15/025 |
| Steam boilers of drum type | F22B 5/00 |
| Steam boilers of combined fire tube type and water tube type | F22B 11/00 |
| Steam boilers of fire box type | F22B 13/00 |
| Steam boilers of water tube type | F22B 15/00, F22B 17/00, F22B 19/00, F22B 21/00, F22B 23/00, F22B 25/00 |
| Instantaneous of flash steam boilers | F22B 27/00 |
| Steam boilers of forced flow type | F22B 29/00 |
| Modifications of boiler construction | F22B 31/00 |
| Steam boilers of furnace tube type | F22B 7/00 |
| Steam boilers of fire tube type | F22B 9/00 |