

# SECTION F — MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

## F23 COMBUSTION APPARATUS; COMBUSTION PROCESSES

### F23C METHODS OR APPARATUS FOR COMBUSTION USING FLUENT FUEL (burners F23D)

#### Note(s) [2006.01]

In this subclass, methods are classified in the groups that cover the apparatus used.

#### Subclass index

#### COMBUSTION APPARATUS SPECIALLY ADAPTED FOR COMBUSTION OF TWO OR MORE

TYPES OF FUEL.....1/00

COMBINATIONS OF TWO OR MORE COMBUSTION CHAMBERS.....6/00

#### FUNCTIONAL TYPES OF COMBUSTION APPARATUS

Fluidised bed combustion.....10/00

Catalytic combustion.....13/00

Resonant combustion.....15/00

#### COMBUSTION APPARATUS CHARACTERISED BY SUBSYSTEMS

Combustion chambers.....3/00

Arrangement or mounting of burners.....5/00

Air supply.....7/00

Arrangements for returning flue gases or combustion products.....9/00

SUBJECT MATTER NOT PROVIDED FOR IN OTHER GROUPS OF THIS SUBCLASS.....99/00

**1/00 Combustion apparatus specially adapted for combustion of two or more kinds of fuel simultaneously or alternately, at least one kind of fuel being fluent** (combustion apparatus characterised by the combination of two or more combustion chambers F23C 6/00; pilot flame igniters F23Q 9/00) [1, 7, 2006.01]

1/02 • lump and liquid fuel

1/04 • lump and gaseous fuel

1/06 • lump and pulverulent fuel

1/08 • liquid and gaseous fuel

1/10 • liquid and pulverulent fuel

1/12 • gaseous and pulverulent fuel

**3/00 Combustion apparatus characterised by the shape of the combustion chamber** (F23C 15/00 takes precedence) [1, 7, 2006.01]

**5/00 Combustion apparatus characterised by the arrangement or mounting of burners** [1, 7, 2006.01]

5/02 • Structural details of mounting

5/06 • • Provision for adjustment of burner position during operation

5/08 • Disposition of burners

5/14 • • to obtain a single flame of concentrated or substantially planar form, e.g. pencil or sheet flame (F23C 5/32 takes precedence) [3]

5/24 • • to obtain a loop flame

5/28 • • to obtain flames in opposing directions, e.g. impacting flames

5/32 • • to obtain rotating flames, i.e. flames moving helically or spirally [3]

**6/00 Combustion apparatus characterised by the combination of two or more combustion chambers** [3, 7, 2006.01]

6/02 • in parallel arrangement [3]

6/04 • in series connection [3]

**7/00 Combustion apparatus characterised by arrangements for air supply** (inlets for fluidisation air F23C 10/20) [1, 7, 2006.01]

7/02 • Disposition of air supply not passing through burner

7/04 • • to obtain maximum heat transfer to wall of combustion chamber

7/06 • • for heating the incoming air (arrangements of regenerators or recuperators F23L 15/00)

7/08 • • • indirectly by a secondary fluid other than the combustion products

**9/00 Combustion apparatus characterised by arrangements for returning combustion products or flue gases to the combustion chamber** (fluidised bed combustion apparatus with means for recirculation of particles entrained from the bed F23C 10/02; fluidised bed combustion apparatus with devices for removal and partial reintroduction of material from the bed F23C 10/26) [1, 7, 2006.01]

9/06 • for completing combustion [3]

9/08 • for reducing temperature in combustion chamber, e.g. for protecting walls of combustion chamber [3]

**10/00 Apparatus in which combustion takes place in a fluidised bed of fuel or other particles [7]****Note(s)**

In this group, it is desirable to add the indexing code of group F23C 101/00.

- 10/01 • in a fluidised bed of catalytic particles **[2006.01]**
- 10/02 • with means specially adapted for achieving or promoting a circulating movement of particles within the bed or for a recirculation of particles entrained from the bed **[7]**
- 10/04 • • the particles being circulated to a section, e.g. a heat-exchange section or a return duct, at least partially shielded from the combustion zone, before being reintroduced into the combustion zone **[7]**
- 10/06 • • • the circulating movement being promoted by inducing differing degrees of fluidisation in different parts of the bed **[7]**
- 10/08 • • • characterised by the arrangement of separation apparatus, e.g. cyclones, for separating particles from the flue gases **[7]**
- 10/10 • • • • the separation apparatus being located outside the combustion chamber **[7]**
- 10/12 • • the particles being circulated exclusively within the combustion zone **[7]**
- 10/14 • • • the circulating movement being promoted by inducing differing degrees of fluidisation in different parts of the bed **[7]**
- 10/16 • specially adapted for operation at superatmospheric pressures, e.g. by the arrangement of the combustion chamber and its auxiliary systems inside a pressure vessel **[7]**
- 10/18 • Details; Accessories **[7]**
- 10/20 • • Inlets for fluidisation air, e.g. grids; Bottoms **[7]**
- 10/22 • • Fuel feeders specially adapted for fluidised bed combustion apparatus (F23C 10/26 takes precedence) **[7]**

- 10/24 • • Devices for removal of material from the bed (devices for controlling the level of the bed or the amount of material in the bed F23C 10/30) **[7]**
- 10/26 • • • combined with devices for partial reintroduction of material into the bed, e.g. after separation of agglomerated parts **[7]**
- 10/28 • • Control devices specially adapted for fluidised bed combustion apparatus **[7]**
- 10/30 • • • for controlling the level of the bed or the amount of material in the bed **[7]**
- 10/32 • • • • by controlling the rate of recirculation of particles separated from the flue gases **[7]**

**13/00 Apparatus in which combustion takes place in the presence of catalytic material** (in a fluidised bed of catalytic particles F23C 10/01; radiant gas burners using catalysis for flameless combustion F23D 14/18) **[2006.01]**

- 13/02 • characterised by arrangements for starting the operation, e.g. for heating the catalytic material to operating temperature **[2006.01]**
- 13/04 • characterised by the arrangement of two or more catalytic elements in series connection **[2006.01]**
- 13/06 • in which non-catalytic combustion takes place in addition to catalytic combustion, e.g. downstream of a catalytic element **[2006.01]**
- 13/08 • characterised by the catalytic material **[2006.01]**

**15/00 Apparatus in which combustion takes place in pulses influenced by acoustic resonance in a gas mass [2006.01]****99/00 Subject matter not provided for in other groups of this subclass [2006.01]****Indexing scheme associated with group F23C 10/00, relating to combustion in entrained fluidised beds. [7]****101/00 Combustion in entrained fluidised beds, i.e. fluidised beds which have no distinct upper surface [7]**