

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

### F27 FURNACES; KILNS; OVENS; RETORTS

#### Note(s) [7]

- This class covers:
  - furnaces, kilns, ovens, retorts, open sintering apparatus and other similar apparatus for heat treatment of materials or articles, and details or accessories therefor, in general;
  - the arrangement of electrical heating elements in or on furnaces.
- This class does not cover:
  - combustion apparatus per se, i.e. apparatus for direct combination of oxygen gas and a burnable substance;
  - electrical heating elements per se;
  - processes carried on within the furnaces.
- In this class, the following term is used with the meaning indicated:
  - "furnaces" covers kilns, ovens, or retorts.

**F27B FURNACES, KILNS, OVENS, OR RETORTS IN GENERAL; OPEN SINTERING OR LIKE APPARATUS** (combustion apparatus F23; electric heating H05B)

#### Note(s)

Attention is drawn to the references and Notes following the title of class F27 and the Note (3) of section H.

#### Subclass index

##### FURNACES WITH STATIONARY CHARGE

Shaft furnaces.....	1/00
Horizontal furnaces.....	3/00, 5/00
Bell-type furnaces.....	11/00
With progression of heating.....	13/00
Crucible furnaces, tank furnaces.....	14/00

##### STATIONARY FURNACES WITH MECHANICALLY-MOVED CHARGE.....9/00

##### ROTARY FURNACES.....7/00, 13/00

##### OTHER FURNACES; COMBINATIONS.....15/00, 17/00, 19/00

##### OPEN SINTERING OR LIKE APPARATUS.....21/00

<b>1/00</b>	<b>Shaft or like vertical or substantially vertical furnaces</b> (for preheating, burning, calcining or cooling lime, magnesia or dolomite C04B 2/12) <b>[1, 2006.01]</b>	1/21	• • Arrangement of devices for discharging <b>[4, 2006.01]</b>
1/02	• with two or more shafts or chambers, e.g. multi-storey <b>[1, 2006.01]</b>	1/22	• • Arrangements of heat-exchange apparatus (heat-exchangers in general F28C, F28D) <b>[1, 2006.01]</b>
1/04	• • Combinations or arrangements of shafts <b>[1, 2006.01]</b>	1/24	• • Cooling arrangements <b>[1, 2006.01]</b>
1/06	• of other than up-draught type <b>[1, 2006.01]</b>	1/26	• • Arrangements of controlling devices <b>[1, 2006.01]</b>
1/08	• heated otherwise than by solid fuel mixed with charge <b>[1, 2006.01]</b>	1/28	• • Arrangements of monitoring devices, of indicators, of alarm devices <b>[1, 2006.01]</b>
1/09	• • heated electrically <b>[4, 2006.01]</b>	<b>3/00</b>	<b>Hearth-type furnaces, e.g. of reverberatory type</b> (F27B 9/00-F27B 15/00, F27B 21/00 take precedence); <b>Electric arc furnaces [1, 4, 2006.01]</b>
1/10	• Details, accessories, or equipment peculiar to furnaces of these types <b>[1, 2006.01]</b>	3/02	• of single-chamber fixed-hearth type <b>[1, 2006.01]</b>
1/12	• • Shells or casings; Supports therefor <b>[1, 2006.01]</b>	3/04	• of multiple-hearth type; of multiple-chamber type; Combinations of hearth-type furnaces <b>[1, 2006.01]</b>
1/14	• • • Arrangements of linings (linings in general F27D 1/00) <b>[1, 2006.01]</b>	3/06	• with movable working chambers or hearths, e.g. tiltable <b>[1, 2006.01]</b>
1/16	• • Arrangements of tuyères <b>[1, 2006.01]</b>	3/08	• heated electrically, e.g. electric arc furnaces, with or without any other source of heat <b>[1, 2006.01]</b>
1/18	• • Arrangements of dust collectors <b>[1, 2006.01]</b>		
1/20	• • Arrangement of devices for charging <b>[1, 4, 2006.01]</b>		

- 3/10 • Details, accessories, or equipment, e.g. dust-collectors, peculiar to hearth-type furnaces [1, 2006.01]
- 3/12 • • Working chambers or casings; Supports therefor [1, 2006.01]
- 3/14 • • • Arrangements of linings [1, 2006.01]
- 3/16 • • • Walls; Roofs [1, 2006.01]
- 3/18 • • Arrangement of devices for charging [1, 4, 2006.01]
- 3/19 • • Arrangement of devices for discharging [4, 2006.01]
- 3/20 • • Arrangements of heating devices [1, 2006.01]
- 3/22 • • Arrangements of air or gas supply devices [1, 2006.01]
- 3/24 • • Cooling arrangements [1, 2006.01]
- 3/26 • • Arrangements of heat-exchange apparatus [1, 2006.01]
- 3/28 • • Arrangement of controlling, monitoring, alarm or like devices [4, 2006.01]
  
- 5/00 Muffle furnaces; Retort furnaces; Other furnaces in which the charge is held completely isolated (F27B 9/00 takes precedence) [1, 2006.01]**
- 5/02 • of multiple-chamber type [1, 2006.01]
- 5/04 • adapted for treating the charge in vacuum or special atmosphere [1, 2006.01]
- 5/05 • • in vacuum [5, 2006.01]
- 5/06 • Details, accessories, or equipment peculiar to furnaces of these types [1, 2006.01]
- 5/08 • • Arrangements of linings [1, 2006.01]
- 5/10 • • Muffles [1, 2006.01]
- 5/12 • • Arrangement of devices for charging [1, 4, 2006.01]
- 5/13 • • Arrangement of devices for discharging [4, 2006.01]
- 5/14 • • Arrangements of heating devices [1, 2006.01]
- 5/16 • • Arrangements of air or gas supply devices [1, 2006.01]
- 5/18 • • Arrangement of controlling, monitoring, alarm or like devices [4, 2006.01]
  
- 7/00 Rotary-drum furnaces, i.e. horizontal or slightly inclined [1, 2006.01]**
- 7/02 • of multiple-chamber or multiple-drum type [1, 2006.01]
- 7/04 • • with longitudinal divisions [1, 2006.01]
- 7/06 • adapted for treating the charge in vacuum or special atmosphere [1, 2006.01]
- 7/08 • externally heated [1, 2006.01]
- 7/10 • internally heated, e.g. by means of passages in the wall [1, 2006.01]
- 7/12 • tiltable [1, 2006.01]
- 7/14 • with means for agitating or moving the charge [1, 2006.01]
- 7/16 • • the means being fixed relatively to the drum (F27B 7/04 takes precedence) [1, 2006.01]
- 7/18 • • the means being movable within the drum [1, 2006.01]
- 7/20 • Details, accessories, or equipment peculiar to rotary-drum furnaces [1, 2006.01]
- 7/22 • • Rotary drums; Supports therefor [1, 2006.01]
- 7/24 • • • Seals between rotary and stationary parts [1, 2006.01]
- 7/26 • • Drives [1, 2006.01]
- 7/28 • • Arrangements of linings [1, 2006.01]
- 7/30 • • Arrangements of partitions [1, 2006.01]
  
- 7/32 • • Arrangement of devices for charging [1, 4, 2006.01]
- 7/33 • • Arrangement of devices for discharging [4, 2006.01]
- 7/34 • • Arrangements of heating devices [1, 2006.01]
- 7/36 • • Arrangements of air or gas supply devices [1, 2006.01]
- 7/38 • • Arrangements of cooling devices [1, 2006.01]
- 7/40 • • • Planetary coolers [4, 2006.01]
- 7/42 • • Arrangement of controlling, monitoring, alarm or like devices [4, 2006.01]
  
- 9/00 Furnaces through which the charge is moved mechanically, e.g. of tunnel type (F27B 7/14 takes precedence); Similar furnaces in which the charge moves by gravity [1, 2006.01]**
- 9/02 • of multiple-track type; of multiple-chamber type; Combinations of furnaces [1, 2006.01]
- 9/04 • adapted for treating the charge in vacuum or special atmosphere [1, 2006.01]
- 9/06 • heated without contact between combustion gases and charge; electrically heated [1, 2006.01]
- 9/08 • • heated through chamber walls [1, 2006.01]
- 9/10 • • heated by hot air or gas [1, 2006.01]
- 9/12 • with special arrangements for preheating or cooling the charge [1, 2006.01]
- 9/14 • characterised by the path of the charge during treatment; characterised by the means by which the charge is moved during treatment (F27B 9/28 takes precedence; travelling or movable supports or containers for the charge F27D 3/12) [1, 2006.01]
- 9/16 • • the charge moving in a circular or arcuate path [1, 2006.01]
- 9/18 • • • under the action of scrapers or pushers [1, 2006.01]
- 9/20 • • the charge moving in a substantially straight path [1, 2006.01]
- 9/22 • • • under the action of scrapers or pushers (F27B 9/26 takes precedence) [1, 2006.01]
- 9/24 • • • being carried by a conveyor [1, 2006.01]
- 9/26 • • • on or in trucks, sleds, or containers [1, 2006.01]
- 9/28 • for treating continuous lengths of work [1, 2006.01]
- 9/30 • Details, accessories, or equipment peculiar to furnaces of these types [1, 2006.01]
- 9/32 • • Casings [1, 2006.01]
- 9/34 • • • Arrangements of linings [1, 2006.01]
- 9/36 • • Arrangements of heating devices [1, 2006.01]
- 9/38 • • Arrangement of devices for charging [1, 4, 2006.01]
- 9/39 • • Arrangement of devices for discharging [4, 2006.01]
- 9/40 • • Arrangements of controlling or monitoring devices [1, 2006.01]
  
- 11/00 Bell-type furnaces (for treating metal strips or wire C21D 9/663) [1, 2006.01]**
  
- 13/00 Furnaces with both stationary charge and progression of heating, e.g. of ring type, of type in which segmental kiln moves over stationary charge [1, 2006.01]**
- 13/02 • of multiple-chamber type with permanent partitions; Combinations of furnaces [1, 2006.01]
- 13/04 • of single-chamber type with temporary partitions [1, 2006.01]
- 13/06 • Details, accessories, or equipment peculiar to furnaces of this type [1, 2006.01]

- 13/08 • • Casings [1, 2006.01]
- 13/10 • • • Arrangements of linings [1, 2006.01]
- 13/12 • • Arrangements of heating devices [1, 2006.01]
- 13/14 • • Arrangement of controlling, monitoring, alarm or like devices [4, 2006.01]
- 14/00 Crucible or pot furnaces; Tank furnaces [1, 4, 2006.01]**
- 14/02 • with tilting or rocking arrangements (F27B 14/04 takes precedence) [1, 2006.01]
- 14/04 • adapted for treating the charge in vacuum or special atmosphere [1, 2006.01]
- 14/06 • heated electrically, e.g. induction crucible furnaces, with or without any other source of heat (F27B 14/04 takes precedence) [1, 2006.01]
- 14/08 • Details peculiar to crucible, pot or tank furnaces [1, 4, 2006.01]
- 14/10 • • Crucibles [1, 2006.01]
- 14/12 • • • Covers therefor [1, 2006.01]
- 14/14 • • Arrangements of heating devices [1, 2006.01]
- 14/16 • • Arrangement of devices for charging [4, 2006.01]
- 14/18 • • Arrangement of devices for discharging [4, 2006.01]
- 14/20 • • Arrangement of controlling, monitoring, alarm or like devices [4, 2006.01]
- 15/00 Fluidised-bed furnaces; Other furnaces using or treating finely-divided materials in dispersion (combustion apparatus in which combustion takes place in a fluidised bed of fuel or other particles F23C 10/00) [1, 2006.01]**
- 15/02 • Details, accessories, or equipment peculiar to furnaces of these types [1, 2006.01]
- 15/04 • • Casings; Supports therefor [1, 2006.01]
- 15/06 • • • Arrangements of linings [1, 2006.01]
- 15/08 • • Arrangement of devices for charging [1, 4, 2006.01]
- 15/09 • • Arrangement of devices for discharging [4, 2006.01]
- 15/10 • • Arrangements of air or gas supply devices [1, 2006.01]
- 15/12 • • Arrangements of dust collectors [1, 2006.01]
- 15/14 • • Arrangements of heating devices [1, 2006.01]
- 15/16 • • Arrangements of cooling devices [1, 2006.01]
- 15/18 • • Arrangements of controlling devices [1, 2006.01]
- 15/20 • • Arrangements of monitoring devices, of indicators, of alarm devices [1, 2006.01]
- 17/00 Furnaces of a kind not covered by any of groups F27B 1/00-F27B 15/00 (structural combinations of furnaces F27B 19/02) [1, 2006.01]**
- 17/02 • specially designed for laboratory use [1, 2006.01]
- 19/00 Combinations of different kinds of furnaces that are not all covered by any single one of main groups F27B 1/00-F27B 17/00 [1, 2006.01]**
- 19/02 • combined in one structure [1, 2006.01]
- 19/04 • arranged for associated working [1, 2006.01]
- 21/00 Open or uncovered sintering apparatus; Other heat-treatment apparatus of like construction [1, 2006.01]**
- 21/02 • Sintering grates or tables [1, 2006.01]
- 21/04 • Sintering pots or sintering pans [1, 2006.01]
- 21/06 • Endless-strand sintering machines [1, 2006.01]
- 21/08 • Details, accessories, or equipment peculiar to sintering or like apparatus [4, 2006.01]
- 21/10 • • Arrangement of devices for charging [4, 2006.01]
- 21/12 • • Arrangement of devices for discharging [4, 2006.01]
- 21/14 • • Arrangement of controlling, monitoring, alarm or like devices [4, 2006.01]
- F27D DETAILS OR ACCESSORIES OF FURNACES, KILNS, OVENS, OR RETORTS, IN SO FAR AS THEY ARE OF KINDS OCCURRING IN MORE THAN ONE KIND OF FURNACE (combustion apparatus F23; electric heating H05B)**

**Note(s)**

Attention is drawn to the references and Notes following the title of class F27 and Note (3) of section H.

**Subclass index**

CONSTRUCTIONAL FEATURES.....	1/00
HANDLING AND SUPPORTING CHARGE.....	3/00, 5/00, 15/00
PREHEATING CHARGE; COOLING; USING WASTE HEAT OR GASES.....	13/00, 9/00, 15/02, 17/00
ARRANGEMENTS OF ELECTRIC HEATING ELEMENTS.....	11/00
ARRANGEMENTS OF CONTROL AND SAFETY DEVICES.....	19/00, 21/00
OTHER FEATURES; OTHER DETAILS.....	7/00, 25/00, 27/00, 99/00

- 1/00 Casings; Linings; Walls; Roofs (refractory materials C04B; firebridges for combustion chambers F23M 3/00) [1, 2006.01]**
- 1/02 • Crowns; Roofs [1, 2006.01]
- 1/04 • characterised by the form of the bricks or blocks used [1, 2006.01]
- 1/06 • • Composite bricks or blocks [1, 2006.01]
- 1/08 • • • Bricks or blocks with internal reinforcement or metal backing [1, 2006.01]
- 1/10 • Monolithic linings; Supports therefor [1, 2006.01]
- 1/12 • incorporating cooling arrangements (constructions of tube assemblies in general F28) [1, 2006.01]
- 1/14 • Supports for linings (F27D 1/10 takes precedence) [1, 2006.01]
- 1/16 • Making or repairing linings [1, 2006.01]
- 1/18 • Door frames; Doors, lids, removable covers [1, 2006.01]

**F27D**

- 3/00 Charging; Discharging; Manipulation of charge** (conveying systems characterised by their application for specified purposes not otherwise provided for B65G 49/00; moving charge through a furnace F27B 9/14) [**1, 2006.01**]
- 3/02 • Skids or tracks for heavy objects [**1, 2006.01**]
- 3/04 • Ram or pusher apparatus [**1, 2006.01**]
- 3/06 • Charging or discharging machines on travelling carriages [**1, 2006.01**]
- 3/08 • Screw feeders; Screw dischargers [**1, 2006.01**]
- 3/10 • Charging directly from hoppers or shoots [**1, 2006.01**]
- 3/12 • Travelling or movable supports or containers for the charge [**1, 2006.01**]
- 3/14 • Charging or discharging liquid or molten material [**1, 2006.01**]
- 3/15 • Tapping equipment; Equipment for removing slag [**1, 2006.01**]
- 3/16 • Introducing a fluid jet or current into the charge (F27D 3/18 takes precedence) [**1, 3, 2006.01**]
- 3/18 • Charging particulate material using a fluid carrier [**3, 2006.01**]
- 5/00 Supports, screens, or the like for the charge within the furnace** (travelling or movable supports F27D 3/12) [**1, 2006.01**]
- 7/00 Forming, maintaining, or circulating atmospheres in heating chambers** [**1, 2006.01**]
- 7/02 • Supplying steam, vapour, gases, or liquids [**1, 2006.01**]
- 7/04 • Circulating atmospheres by mechanical means [**1, 2006.01**]
- 7/06 • Forming or maintaining special atmospheres or vacuum within heating chambers (F27D 7/02 takes precedence) [**1, 2006.01**]
- 9/00 Cooling of furnaces or of charges therein** (F27D 1/00, F27D 3/00 take precedence) [**1, 2006.01**]
- 11/00 Arrangement of elements for electric heating in or on furnaces** (electric heating *per se* H05B) [**1, 2006.01**]
- 11/02 • Ohmic resistance heating [**1, 2006.01**]
- 11/04 • • with direct passage of current through the material being heated [**1, 2006.01**]
- 11/06 • Induction heating, i.e. in which the material being heated, or its container or elements embodied therein, form the secondary of a transformer [**1, 2006.01**]
- 11/08 • Heating by electric discharge, e.g. arc discharge [**1, 2006.01**]
- 11/10 • • Disposition of electrodes (automatic control of temperature G05D 23/00; electric discharge apparatus H01T; arrangements for feeding or guiding electrodes H05B 7/10; automatic control of power by positioning of electrodes H05B 7/144) [**1, 3, 2006.01**]
- 11/12 • with electromagnetic fields acting directly on the material being heated [**1, 2006.01**]
- 13/00 Apparatus for preheating charges; Arrangements for preheating charges** [**1, 2006.01**]
- 15/00 Handling or treating discharged material; Supports or receiving chambers therefor** [**1, 2006.01**]
- 15/02 • Cooling [**1, 2006.01**]
- 17/00 Arrangement for using waste heat** (heat-exchangers *per se* F28); **Arrangement for using, or disposing of, waste gases** (removing fumes in general B08B 15/00) [**1, 2006.01**]
- 19/00 Arrangement of controlling devices** [**1, 2006.01**]
- 21/00 Arrangement of monitoring devices; Arrangements of safety devices** [**1, 2006.01**]
- 21/02 • Observation or illuminating devices [**1, 2006.01**]
- 21/04 • Arrangements of indicators or alarms [**1, 2006.01**]
- 25/00 Devices for removing incrustations** [**2010.01**]
- 27/00 Stirring devices for molten material** (F27D 3/14 takes precedence) [**2010.01**]
- 99/00 Subject matter not provided for in other groups of this subclass** [**2010.01**]