

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

F27 FURNACES; KILNS; OVENS; RETORTS

Note(s) [7]

1. 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.
2. 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.
3. 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
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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

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

- 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]	15/08	• • Arrangement of devices for charging [1, 4, 2006.01]
13/10	• • • Arrangements of linings [1, 2006.01]	15/09	• • Arrangement of devices for discharging [4, 2006.01]
13/12	• • Arrangements of heating devices [1, 2006.01]	15/10	• • Arrangements of air or gas supply devices [1, 2006.01]
13/14	• • Arrangement of controlling, monitoring, alarm or like devices [4, 2006.01]	15/12	• • Arrangements of dust collectors [1, 2006.01]
14/00	Crucible or pot furnaces; Tank furnaces [1, 4, 2006.01]	15/14	• • Arrangements of heating devices [1, 2006.01]
14/02	• with tilting or rocking arrangements (F27B 14/04 takes precedence) [1, 2006.01]	15/16	• • Arrangements of cooling devices [1, 2006.01]
14/04	• adapted for treating the charge in vacuum or special atmosphere [1, 2006.01]	15/18	• • Arrangements of controlling devices [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]	15/20	• • Arrangements of monitoring devices, of indicators, of alarm devices [1, 2006.01]
14/08	• Details peculiar to crucible, pot or tank furnaces [1, 4, 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]
14/10	• • Crucibles [1, 2006.01]	17/02	• specially designed for laboratory use [1, 2006.01]
14/12	• • • Covers therefor [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]
14/14	• • Arrangements of heating devices [1, 2006.01]	19/02	• combined in one structure [1, 2006.01]
14/16	• • Arrangement of devices for charging [4, 2006.01]	19/04	• arranged for associated working [1, 2006.01]
14/18	• • Arrangement of devices for discharging [4, 2006.01]	21/00	Open or uncovered sintering apparatus; Other heat-treatment apparatus of like construction [1, 2006.01]
14/20	• • Arrangement of controlling, monitoring, alarm or like devices [4, 2006.01]	21/02	• Sintering grates or tables [1, 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]	21/04	• Sintering pots or sintering pans [1, 2006.01]
15/02	• Details, accessories, or equipment peculiar to furnaces of these types [1, 2006.01]	21/06	• Endless-strand sintering machines [1, 2006.01]
15/04	• • Casings; Supports therefor [1, 2006.01]	21/08	• Details, accessories, or equipment peculiar to sintering or like apparatus [4, 2006.01]
15/06	• • • Arrangements of linings [1, 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
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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]	1/12	• incorporating cooling arrangements (constructions of tube assemblies in general F28) [1, 2006.01]
1/02	• Crowns; Roofs [1, 2006.01]	1/14	• Supports for linings (F27D 1/10 takes precedence) [1, 2006.01]
1/04	• characterised by the form of the bricks or blocks used [1, 2006.01]	1/16	• Making or repairing linings [1, 2006.01]
1/06	• • Composite bricks or blocks [1, 2006.01]	1/18	• Door frames; Doors, lids, removable covers [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]		

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**]