

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

F27 FURNACES; KILNS; OVENS; RETORTS

Note(s)

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

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- 3/14 • • • Arrangements of linings
- 3/16 • • • Walls; Roofs
- 3/18 • • Arrangement of devices for charging [4]
- 3/19 • • Arrangement of devices for discharging [4]
- 3/20 • • Arrangements of heating devices
- 3/22 • • Arrangements of air or gas supply devices
- 3/24 • • Cooling arrangements
- 3/26 • • Arrangements of heat-exchange apparatus
- 3/28 • • Arrangement of controlling, monitoring, alarm or like devices [4]

- 5/00 Muffle furnaces; Retort furnaces; Other furnaces in which the charge is held completely isolated** (F27B 9/00 takes precedence)
- 5/02 • of multiple-chamber type
- 5/04 • adapted for treating the charge in vacuum or special atmosphere
- 5/05 • • in vacuum [5]
- 5/06 • Details, accessories, or equipment peculiar to furnaces of these types
- 5/08 • • Arrangements of linings
- 5/10 • • Muffles
- 5/12 • • Arrangement of devices for charging [4]
- 5/13 • • Arrangement of devices for discharging [4]
- 5/14 • • Arrangements of heating devices
- 5/16 • • Arrangements of air or gas supply devices
- 5/18 • • Arrangement of controlling, monitoring, alarm or like devices [4]

- 7/00 Rotary-drum furnaces, i.e. horizontal or slightly inclined**
- 7/02 • of multiple-chamber or multiple-drum type
- 7/04 • • with longitudinal divisions
- 7/06 • adapted for treating the charge in vacuum or special atmosphere
- 7/08 • externally heated
- 7/10 • internally heated, e.g. by means of passages in the wall
- 7/12 • tiltable
- 7/14 • with means for agitating or moving the charge
- 7/16 • • the means being fixed relatively to the drum (F27B 7/04 takes precedence)
- 7/18 • • the means being movable within the drum
- 7/20 • Details, accessories, or equipment peculiar to rotary-drum furnaces
- 7/22 • • Rotary drums; Supports therefor
- 7/24 • • • Seals between rotary and stationary parts
- 7/26 • • Drives
- 7/28 • • Arrangements of linings
- 7/30 • • Arrangements of partitions
- 7/32 • • Arrangement of devices for charging [4]
- 7/33 • • Arrangement of devices for discharging [4]
- 7/34 • • Arrangements of heating devices
- 7/36 • • Arrangements of air or gas supply devices
- 7/38 • • Arrangements of cooling devices
- 7/40 • • • Planetary coolers [4]
- 7/42 • • Arrangement of controlling, monitoring, alarm or like devices [4]

- 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**
- 9/02 • of multiple-track type; of multiple-chamber type; Combinations of furnaces
- 9/04 • adapted for treating the charge in vacuum or special atmosphere
- 9/06 • heated without contact between combustion gases and charge; electrically heated
- 9/08 • • heated through chamber walls
- 9/10 • • heated by hot air or gas
- 9/12 • with special arrangements for preheating or cooling the charge
- 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)
- 9/16 • • the charge moving in a circular or arcuate path
- 9/18 • • • under the action of scrapers or pushers
- 9/20 • • the charge moving in a substantially straight path
- 9/22 • • • under the action of scrapers or pushers (F27B 9/26 takes precedence)
- 9/24 • • • being carried by a conveyor
- 9/26 • • • on or in trucks, sleds, or containers
- 9/28 • for treating continuous lengths of work
- 9/30 • Details, accessories, or equipment peculiar to furnaces of these types
- 9/32 • • Casings
- 9/34 • • • Arrangements of linings
- 9/36 • • Arrangements of heating devices
- 9/38 • • Arrangement of devices for charging [4]
- 9/39 • • Arrangement of devices for discharging [4]
- 9/40 • • Arrangements of controlling or monitoring devices

- 11/00 Bell-type furnaces** (for treating metal strips or wire C21D 9/663)

- 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**
- 13/02 • of multiple-chamber type with permanent partitions; Combinations of furnaces
- 13/04 • of single-chamber type with temporary partitions
- 13/06 • Details, accessories, or equipment peculiar to furnaces of this type
- 13/08 • • Casings
- 13/10 • • • Arrangements of linings
- 13/12 • • Arrangements of heating devices
- 13/14 • • Arrangement of controlling, monitoring, alarm or like devices [4]

- 14/00 Crucible or pot furnaces; Tank furnaces [4]**
- 14/02 • with tilting or rocking arrangements (F27B 14/04 takes precedence)
- 14/04 • adapted for treating the charge in vacuum or special atmosphere
- 14/06 • heated electrically, e.g. induction crucible furnaces, with or without any other source of heat (F27B 14/04 takes precedence)
- 14/08 • Details peculiar to crucible, pot or tank furnaces [4]
- 14/10 • • Crucibles
- 14/12 • • • Covers therefor
- 14/14 • • Arrangements of heating devices
- 14/16 • • Arrangement of devices for charging [4]
- 14/18 • • Arrangement of devices for discharging [4]
- 14/20 • • Arrangement of controlling, monitoring, alarm or like devices [4]

<p>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)</p> <p>15/02 • Details, accessories, or equipment peculiar to furnaces of these types</p> <p>15/04 • • Casings; Supports therefor</p> <p>15/06 • • • Arrangements of linings</p> <p>15/08 • • Arrangement of devices for charging [4]</p> <p>15/09 • • Arrangement of devices for discharging [4]</p> <p>15/10 • • Arrangements of air or gas supply devices</p> <p>15/12 • • Arrangements of dust collectors</p> <p>15/14 • • Arrangements of heating devices</p> <p>15/16 • • Arrangements of cooling devices</p> <p>15/18 • • Arrangements of controlling devices</p> <p>15/20 • • Arrangements of monitoring devices, of indicators, of alarm devices</p> <p>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)</p>	<p>17/02 • specially designed for laboratory use</p> <p>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</p> <p>19/02 • combined in one structure</p> <p>19/04 • arranged for associated working</p> <p>21/00 Open or uncovered sintering apparatus; Other heat-treatment apparatus of like construction</p> <p>21/02 • Sintering grates or tables</p> <p>21/04 • Sintering pots or sintering pans</p> <p>21/06 • Endless-strand sintering machines</p> <p>21/08 • Details, accessories, or equipment peculiar to sintering or like apparatus [4]</p> <p>21/10 • • Arrangement of devices for charging [4]</p> <p>21/12 • • Arrangement of devices for discharging [4]</p> <p>21/14 • • Arrangement of controlling, monitoring, alarm or like devices [4]</p>
<p>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)</p>	

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
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PREHEATING CHARGE; COOLING; USING WASTE HEAT OR GASES.....	13/00, 9/00, 15/02, 17/00
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<p>1/00 Casings; Linings; Walls; Roofs (refractory materials C04B; firebridges for combustion chambers F23M 3/00)</p> <p>1/02 • Crowns; Roofs</p> <p>1/04 • characterised by the form of the bricks or blocks used</p> <p>1/06 • • Composite bricks or blocks</p> <p>1/08 • • • Bricks or blocks with internal reinforcement or metal backing</p> <p>1/10 • Monolithic linings; Supports therefor</p> <p>1/12 • incorporating cooling arrangements (constructions of tube assemblies in general F28)</p> <p>1/14 • Supports for linings (F27D 1/10 takes precedence)</p> <p>1/16 • Making or repairing linings</p> <p>1/18 • Door frames; Doors, lids, removable covers</p> <p>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)</p> <p>3/02 • Skids or tracks for heavy objects</p> <p>3/04 • Ram or pusher apparatus</p> <p>3/06 • Charging or discharging machines on travelling carriages</p> <p>3/08 • Screw feeders; Screw dischargers</p> <p>3/10 • Charging directly from hoppers or shoots</p>	<p>3/12 • Travelling or movable supports or containers for the charge</p> <p>3/14 • Charging or discharging liquid or molten material</p> <p>3/15 • Tapping equipment; Equipment for removing slag</p> <p>3/16 • Introducing a fluid jet or current into the charge (F27D 3/18 takes precedence) [3]</p> <p>3/18 • Charging particulate material using a fluid carrier [3]</p> <p>5/00 Supports, screens, or the like for the charge within the furnace (travelling or movable supports F27D 3/12)</p> <p>7/00 Forming, maintaining, or circulating atmospheres in heating chambers</p> <p>7/02 • Supplying steam, vapour, gases, or liquids</p> <p>7/04 • Circulating atmospheres by mechanical means</p> <p>7/06 • Forming or maintaining special atmospheres or vacuum within heating chambers (F27D 7/02 takes precedence)</p> <p>9/00 Cooling of furnaces or of charges therein (F27D 1/00, F27D 3/00 take precedence)</p> <p>11/00 Arrangement of elements for electric heating in or on furnaces (electric heating <i>per se</i> H05B)</p> <p>11/02 • Ohmic resistance heating</p> <p>11/04 • • with direct passage of current through the material being heated</p>
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F27D

- 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
- 11/08 • Heating by electric discharge, e.g. arc discharge
- 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) [3]
- 11/12 • with electromagnetic fields acting directly on the material being heated
- 13/00 Apparatus for preheating charges; Arrangements for preheating charges**
- 15/00 Handling or treating discharged material; Supports or receiving chambers therefor**
- 15/02 • Cooling
- 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)
- 19/00 Arrangement of controlling devices**
- 21/00 Arrangement of monitoring devices; Arrangements of safety devices**
- 21/02 • Observation or illuminating devices
- 21/04 • Arrangements of indicators or alarms
- 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]**