

**F27 FURNACES; KILNS; OVENS; RETORTS** (specially adapted for a purpose covered by a single other class and specifically mentioned in that class, see the class in question, e.g. bakery ovens A21B, glass melting furnaces C03B, coke or gas-making apparatus C10B, C10J, apparatus for cracking hydrocarbons C10G, blast furnaces C21B, converters for making steel C21C, furnaces for heat treatment of metal C21D; furnaces for electroslag or arc remelting of metals C22B 9/00; enamelling ovens C23D; combustion apparatus F23; electric heating H05B) **[4]**

### Notes

- (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; **[7]**
  - 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**

### Note

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	STATIONARY FURNACES WITH MECHANICALLY-MOVED CHARGE
Shaft furnaces ..... 1/00	..... 9/00
Horizontal furnaces..... 3/00, 5/00	ROTARY FURNACES.....7/00, 13/00
Bell-type furnaces.....11/00	OTHER FURNACES; COMBINATIONS .....15/00, 17/00; 19/00
With progression of heating ..... 13/00	OPEN SINTERING OR LIKE APPARATUS .....21/00
Crucible furnaces, tank furnaces ..... 14/00	

<b>1/00 Shaft or like vertical or substantially vertical furnaces</b> (for preheating, burning, calcining or cooling lime, magnesia or dolomite C04B 2/12)	<b>3/00 Hearth-type furnaces, e.g. of reverberatory type</b> (F27B 9/00 to F27B 15/00, F27B 21/00 take precedence); <b>Electric arc furnaces [4]</b>
1/02 . with two or more shafts or chambers, e.g. multi-storey	3/02 . of single-chamber fixed-hearth type
1/04 . . Combinations or arrangements of shafts	3/04 . of multiple-hearth type; of multiple-chamber type; Combinations of hearth-type furnaces
1/06 . of other than up-draught type	3/06 . with movable working chambers or hearths, e.g. tiltable
1/08 . heated otherwise than by solid fuel mixed with charge	3/08 . heated electrically, e.g. electric arc furnaces, with or without any other source of heat
1/09 . . heated electrically <b>[4]</b>	3/10 . Details, accessories, or equipment, e.g. dust-collectors, peculiar to hearth-type furnaces
1/10 . Details, accessories, or equipment peculiar to furnaces of these types	3/12 . . Working chambers or casings; Supports therefor
1/12 . . Shells or casings; Supports therefor	3/14 . . . Arrangements of linings
1/14 . . . Arrangements of linings (linings in general F27D 1/00)	3/16 . . . Walls; Roofs
1/16 . . Arrangements of tuyères	3/18 . . Arrangement of devices for charging <b>[4]</b>
1/18 . . Arrangements of dust collectors	3/19 . . Arrangement of devices for discharging <b>[4]</b>
1/20 . . Arrangement of devices for charging <b>[4]</b>	3/20 . . Arrangements of heating devices
1/21 . . Arrangement of devices for discharging <b>[4]</b>	3/22 . . Arrangements of air or gas supply devices
1/22 . . Arrangements of heat-exchange apparatus (heat-exchangers in general F28C, F28D)	3/24 . . Cooling arrangements
1/24 . . Cooling arrangements	3/26 . . Arrangements of heat-exchange apparatus
1/26 . . Arrangements of controlling devices	3/28 . . Arrangement of controlling, monitoring, alarm or like devices <b>[4]</b>
1/28 . . Arrangements of monitoring devices, of indicators, of alarm devices	<b>5/00 Muffle furnaces; Retort furnaces; Other furnaces in which the charge is held completely isolated</b> (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 conveyer
- 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]

#### 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)

- 15/02 . . . Details, accessories, or equipment peculiar to furnaces of these types
- 15/04 . . . Casings; Supports therefor
- 15/06 . . . . Arrangements of linings
- 15/08 . . . Arrangement of devices for charging [4]
- 15/09 . . . Arrangement of devices for discharging [4]
- 15/10 . . . Arrangements of air or gas supply devices
- 15/12 . . . Arrangements of dust collectors
- 15/14 . . . Arrangements of heating devices
- 15/16 . . . Arrangements of cooling devices
- 15/18 . . . Arrangements of controlling devices
- 15/20 . . . Arrangements of monitoring devices, of indicators, of alarm devices

<b>17/00</b>	<b>Furnaces of a kind not covered by any of groups F27B 1/00 to F27B 15/00</b> (structural combinations of furnaces F27B 19/02)	<b>21/00</b>	<b>Open or uncovered sintering apparatus; Other heat-treatment apparatus of like construction</b>
17/02	. specially designed for laboratory use	21/02	. Sintering grates or tables
<b>19/00</b>	<b>Combinations of furnaces of kinds not covered by any single one of main groups F27B 1/00 to F27B 17/00</b>	21/04	. Sintering pots or sintering pans
19/02	. combined in one structure	21/06	. Endless-strand sintering machines
19/04	. arranged for associated working	21/08	. Details, accessories, or equipment peculiar to sintering or like apparatus [4]
		21/10	. . Arrangement of devices for charging [4]
		21/12	. . Arrangement of devices for discharging [4]
		21/14	. . Arrangement of controlling, monitoring, alarm or like devices [4]

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**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)

**Note**

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	ARRANGEMENTS OF ELECTRIC	
HANDLING AND SUPPORTING CHARGE.....	3/00, 5/00, 15/00	HEATING ELEMENTS.....	11/00
PREHEATING CHARGE; COOLING; USING		ARRANGEMENTS OF CONTROL AND	
WASTE HEAT OR GASES.....	13/00; 9/00, 15/02; 17/00	SAFETY DEVICES .....	19/00, 21/00
		OTHER FEATURES; OTHER DETAILS .....	7/00; 23/00

<b>1/00</b>	<b>Casings; Linings; Walls; Roofs</b> (refractory materials C04B; firebridges for combustion chambers F23M 3/00)	<b>7/00</b>	<b>Forming, maintaining, or circulating atmospheres in heating chambers</b>
1/02	. Crowns; Roofs	7/02	. Supplying steam, vapour, gases, or liquids
1/04	. characterised by the form of the bricks or blocks used	7/04	. Circulating atmospheres by mechanical means
1/06	. . Composite bricks or blocks	7/06	. Forming or maintaining special atmospheres or vacuum within heating chambers (F27D 7/02 takes precedence)
1/08	. . . Bricks or blocks with internal reinforcement or metal backing		
1/10	. Monolithic linings; Supports therefor	<b>9/00</b>	<b>Cooling of furnaces or of charges therein</b> (F27D 1/00, F27D 3/00 take precedence)
1/12	. incorporating cooling arrangements (constructions of tube assemblies in general F28)	<b>11/00</b>	<b>Arrangement of elements for electric heating in or on furnaces</b> (electric heating <i>per se</i> H05B)
1/14	. Supports for linings (F27D 1/10 takes precedence)	11/02	. Ohmic resistance heating
1/16	. Making or repairing linings	11/04	. . with direct passage of current through the material being heated
1/18	. Door frames; Doors, lids, removable covers	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
<b>3/00</b>	<b>Charging; Discharging; Manipulation of charge</b> (conveying systems characterised by their application for specified purposes not otherwise provided for B65G 49/00; moving charge through a furnace F27B 9/14)	11/08	. Heating by electric discharge, e.g. arc discharge
3/02	. Skids or tracks for heavy objects	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]
3/04	. Ram or pusher apparatus	11/12	. with electromagnetic fields acting directly on the material being heated
3/06	. Charging or discharging machines on travelling carriages	<b>13/00</b>	<b>Apparatus for preheating charges; Arrangements for preheating charges</b>
3/08	. Screw feeders; Screw dischargers	<b>15/00</b>	<b>Handling or treating discharged material; Supports or receiving chambers therefor</b>
3/10	. Charging directly from hoppers or shoots	15/02	. Cooling
3/12	. Travelling or movable supports or containers for the charge		
3/14	. Charging or discharging liquid or molten material		
3/15	. Tapping equipment; Equipment for removing slag		
3/16	. Introducing a fluid jet or current into the charge (F27D 3/18 takes precedence) [3]		
3/18	. Charging particulate material using a fluid carrier [3]		
<b>5/00</b>	<b>Supports, screens, or the like for the charge within the furnace</b> (travelling or movable supports F27D 3/12)		

**F27D**

- 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

- 23/00**    **Details or accessories not covered by any other group of this subclass**
  - 23/02    . Devices for removing incrustations
  - 23/04    . Stirring devices for molten material (mixing in general B01F) [3]