

ECLA EUROPEAN CLASSIFICATION

- F22D PREHEATING, OR ACCUMULATING PREHEATED, FEED-WATER ; FEED-WATER SUPPLY ; CONTROLLING WATER LEVEL ; AUXILIARY DEVICES FOR PROMOTING WATER CIRCULATION WITHIN BOILERS (chemical treatment of water, e.g. purification, C02F ; enclosed heat-exchange apparatus in general F28D ; controlling in general G05)**
- F22D1/00 Feed-water heaters, i.e. economisers or like preheaters**
- F22D1/00B . [N: Feed-water heater systems ([F22D1/32B](#), [F22D1/36](#) and [F22D1/40](#) take precedence)]
 - F22D1/00D . [N: with heating tubes ([F22D1/24](#) takes precedence)] [N9911]
 - F22D1/02 . with water tubes arranged in the boiler furnace, fire tubes, or flue ways (heat-exchange tubes in general F28F)
 - F22D1/04 . . the tubes having plain outer surfaces, e.g. in vertical arrangement
 - F22D1/06 . . . in horizontal arrangement
 - F22D1/08 . . the tubes having fins, ribs, gills, corrugations, or the like on their outer surfaces, e.g. in vertical arrangement
 - F22D1/10 . . . in horizontal arrangement ([hollow fire-bars, grates, or the like used as water tubes F23H3/02](#))
 - F22D1/12 . . Control devices, e.g. for regulating steam temperature
 - F22D1/14 . . Safety or venting devices ([safety devices for boilers in general F22B37/42](#))
 - F22D1/16 . with water tubes arranged otherwise than in the boiler furnace, fire tubes, or flue ways
 - F22D1/18 . . and heated indirectly
 - F22D1/20 . . and directly connected to boilers
 - F22D1/22 . . and provided for rotary movements
 - F22D1/24 . with fire tubes or flue ways traversing feed-water vessels
 - F22D1/26 . with means, other than tubes, to separate water and heating medium, e.g. bulk heaters without internal flues or tubes, jacketed smoke-boxes or flue or flues
 - F22D1/28 . for direct heat transfer, e.g. by mixing water and steam
 - F22D1/30 . . with stages, steps, baffles, dishes, circular troughs, or other means to cause interrupted or cascading fall of water ([de-aeration apparatus C02F](#))
 - F22D1/32 . arranged to be heated by steam, e.g. bled from turbines
 - F22D1/32B . . [N: Schematic arrangements or control devices therefor]
 - F22D1/34 . . and returning condensate to boiler with main feed supply
 - F22D1/36 . Water and air preheating systems
 - F22D1/38 . . Constructional features of water and air preheating systems

- F22D1/40 . Combinations of exhaust-steam and smoke-gas preheaters ([for locomotives F22D1/42](#))
- F22D1/42 . specially adapted for locomotives
- F22D1/44 . . Smoke-gas preheaters
- F22D1/46 . . Exhaust-steam preheaters
- F22D1/48 . . Details
- F22D1/50 . incorporating thermal de-aeration of feed-water (de-aeration produced in the course of direct heat transfer [F22D1/28](#); thermal de-aeration of water per se [B01D19/00](#), [C02F1/20](#); valves for venting [F16K24/04](#))

- F22D3/00** **Accumulators for preheated water**
- F22D3/02 . arranged within combustion chambers
- F22D3/04 . combined with steam accumulators
- F22D3/06 . directly connected to boilers
- F22D3/08 . specially adapted for locomotives ([locomotives boilers F22B13/06](#))
- F22D3/10 . . Control devices ([controlling water feed to boilers, or water level F22D5/00](#))

- F22D5/00** **Controlling water feed or water level; Automatic water feeding or water-level regulators** ([steam traps F16T](#); [measuring or indicating instruments G01](#); [for indicating water level G01F](#); [level control in general G05D9/00](#))
- F22D5/02 . with an intermediate compartment from which the water is fed by gravity after mechanically moving the compartment, the movement being controlled according to water level
- F22D5/04 . with pivoting buckets
- F22D5/06 . with receptacles external to, but in free communication with, the boilers and adapted to move up and down in accordance with change in water level
- F22D5/08 . with float-actuated valves
- F22D5/10 . . and with pistons or membranes unitary with the feed inlet valves
- F22D5/12 . . and with dipping tubes
- F22D5/14 . responsive to thermal expansion and contraction, e.g. of solid elements
- F22D5/16 . . of fluids
- F22D5/18 . for varying the speed or delivery pressure of feed pumps
- F22D5/20 . . without floats
- F22D5/22 . . with floats
- F22D5/24 . with electric switches

- F22D5/26 . Automatic feed-control systems ([automatic safety devices F22B37/42](#); [controlling in general G05](#))
- F22D5/28 . . responsive to amount of steam withdrawn; responsive to steam pressure
- F22D5/30 . . responsive to both water level and amount of steam withdrawn or steam pressure
- F22D5/32 . . influencing the speed or delivery pressure of the feed pumps
- F22D5/34 . . Applications of valves ([valves per se F16K](#))
- F22D5/36 . . for feeding a number of steam boilers designed for different ranges of temperature and pressure

F22D7/00 **Auxiliary devices for promoting water circulation** ([adaptation of boilers for promoting water circulation F22B37/34](#)) [C0901]

- F22D7/02 . Saddles or like directing plates fitted to furnace tubes
- F22D7/04 . Injectors for water or steam
- F22D7/06 . Rotary devices, e.g. propellers
- F22D7/08 . . Arrangements of pumps, e.g. outside the boilers
- F22D7/10 . . . within the boilers
- F22D7/12 . Control devices
- F22D7/14 . specially adapted for locomotive boilers

F22D11/00 **Feed-water supply not provided for in other main groups**

- F22D11/00B . [N: [Emergency feed-water supply \(safety devices for boilers in general F22B37/42\)](#)]
- F22D11/00D . [N: [Arrangements of feedwater cleaning with a boiler](#)] [N9911]
- F22D11/02 . Arrangements of feed-water pumps ([F22D11/06](#) takes precedence; [pumps per se F04](#))
- F22D11/04 . . with means to eliminate steam formation
- F22D11/06 . . for returning condensate to boiler