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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 19326-2022

Replacing GB/T 19326-2012

Forged branch outlet fittings

锻制支管座

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1 Scope

China's national standard for forged branch outlet fittings - the one-piece forgings welded onto the side of a run pipe to take a smaller branch. It specifies the types and codes, the pressure classes, the pipe connection sizes, the special branch outlet fittings, the order content, the shape, size and tolerances, the materials, the design, manufacture and installation, the heat treatment, the inspection and testing, the marking, the surface protection and packaging, and the product quality certificate, with a normative annex on design verification testing and an informative annex on installation. Making a branch in a pressure pipe is one of the routine operations of process piping and one of the most treacherous, because the hole cut in the run pipe removes material that was carrying the hoop stress, and that stress has to go somewhere. Reinforcement is required, and the traditional approaches - a welded pad, or a fabricated stub with a saddle - concentrate stress at the weld toes, need more welding than the branch itself, and are difficult to examine. A forged branch outlet fitting replaces all of that with a single shaped forging whose contoured base matches the outside of the run pipe and whose section provides the reinforcement integrally, attached by one full-penetration weld. What the standard has to fix

is everything that makes such a fitting interchangeable and trustworthy: the dimensional system relating the fitting to the run and branch sizes and the pressure class, the contour of the base for each run diameter, the materials by service, the manufacturing and heat treatment requirements, the examination regime, and the design verification test - a burst or proof test in the annex, since the geometry is too complex for calculation alone to qualify. Issued on 11 July 2022 and in force since 1 February 2023, it replaces GB/T 19326-2012.

This document specifies the types and codes, pressure class, pipe connection sizes, special branch outlet fittings, ordering content, shape, size and tolerance, material, design and manufacturing, heat treatment, inspection and testing, marking, surface protection and packaging, product quality certification requirements of forged branch outlet fittings; provides installation guidelines. This document applies to branch outlet fittings forged with steel materials in pipeline systems.

Note: The branch outlet fittings in this document refer to branch outlet fittings with different diameters, that is, branch outlet fittings with trunk pipes larger than branch pipes.

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in the text. Among them, for referenced documents with dates, only the versions corresponding to the dates apply to this document; for referenced documents without dates, the latest versions (including all amendments) apply to this document.

GB/T 9124 (all parts) Steel pipe flanges

GB/T 12459 Steel butt welding pipe fittings - Types and parameter

GB/T 12716 Pipe threads with the thread angle of 60 degrees where pressure-tight joints are made on threads

GB/T 14383 Forged fittings, socket-welding and threaded

GB/T 18253-2018 Steel and steel products - Types of inspection documents

GB/T 20801.3 Pressure piping code - Industrial piping - Part 3: Design and calculation

GB/T 28708 Specification for size selection of seamless and welded steel pipe used in piping engineering NB/T 47013.3 Nondestructive testing of pressure equipment - Part 3: Ultrasonic testing fittings and elbow branch outlet fittings and other branch outlet fittings that exceed the nominal size and wall thickness range of the trunk pipe listed in Table 2. When using relevant calculations, analysis or verification tests, the manufacturer shall keep these documents and provide them to the purchaser for inspection when necessary. The socket welding, threaded and butt welding 90° branch outlet fittings (including extended branch outlet fittings, flange branch outlet fittings, thin-walled branch outlet fittings) with the

outer diameter size of the body listed in Tables 4 ~ 14 and Tables 18 ~ 20 have passed the limit reinforcement calculation of opening reinforcement, according to the corresponding maximum wall thickness of the trunk pipe.

11.3 The allowable pressure rating of the branch outlet fitting manufactured according to this document can be calculated, based on the seamless straight pipe (trunk pipe welded to the branch outlet fitting) of the same specification, material and wall thickness.

11.4 When the wall thickness class of the branch pipe connected by the branch outlet fitting is different from the wall thickness class of the branch pipe listed in Table 2, the following provisions shall apply: - When the wall thickness of the branch pipe is thicker, the corresponding branch outlet fitting size shall be selected according to the wall thickness of the trunk pipe; the flow aperture (d) shall be determined according to the inner diameter of the branch pipe; in this case, the other dimensions of the butt-welded branch outlet fitting may not be changed; the end outer diameter (D2) of the socket-welded and threaded branch outlet fitting shall not be less than the sum of the outer diameter of the branch pipe and twice the wall thickness of the branch pipe plus 2 mm. If the end outer diameter (D2) is larger than the outer diameter of the body (D1), the end outer diameter (D2) plus 2 mm shall be used as the size of the outer diameter (D1) of the body; - When the wall thickness of the branch pipe is thinner, the corresponding branch outlet fitting size shall be selected according to the wall thickness of the trunk pipe; the flow aperture (d) shall be determined according to the inner diameter of the branch pipe. In this case, other parameters may change, so one of the methods specified in

11.2 shall be used to determine whether the branch outlet fitting design meets the reinforcement requirements.

11.5 The branch outlet fitting can be made by cutting from forgings or bars. When forging is used, the material shall be forged as close to the specified shape and size as possible.

11.6 When forging with steel ingots, the head and tail of the ingot shall be fully cut off, to ensure that defects such as shrinkage, looseness, cracks, excessive segregation are eliminated.

11.7 When forging with steel ingots, billets or continuous casting billets, the forging ratio of the main cross-section of the forging shall be greater than or equal to 3; when forging with bars, the forging ratio of the main cross-section of the forging shall be greater than or equal to 1.6.

12 Heat treatment

12.1 Except as specified in 12.2, the heat treatment of the branch outlet fitting shall comply with the provisions of the corresponding parts of GB/T 14383.

12.2 When the manufacturing conditions meet the following requirements, heat treatment is

not required.

- a) Branch outlet fittings with a material category of carbon steel (excluding carbon steel branch outlet fittings in low-temperature steel) less than or equal to DN100 and a final forging temperature of not less than 700 °C.
- b) Branch outlet fittings made directly from bar cutting, meanwhile the raw materials have been heat treated or the carbon steel materials are in hot-rolled state when leaving the factory.
- c) For forgings with material classes of SF304, SF304L, SF316, SF316L less than or equal to DN100, when the final forging temperature is not less than 1040 °C, they can be quickly cooled in water after final forging to replace solution treatment.

13 Inspection and testing

13.1 Except for the provisions of 13.2 ~ 13.5, the inspection and testing of branch outlet fittings shall comply with the provisions of the corresponding parts of GB/T 14383.

13.2 After negotiation between the supplier and the buyer, branch outlet fittings formed by die forging with material category of carbon steel and less than or equal to DN100 can be accepted, only on the basis of hardness test; in this case, the hardness value shall be 110 HBW ~ 160 HBW.

13.3 For branch outlet fittings formed by free forging process, ultrasonic testing shall be carried out piece by piece according to NB/T 47013.3 after heat treatment; level I is qualified.

13.4 For branch outlet fittings formed by free forging process with material category of carbon steel, low temperature steel and alloy steel, magnetic particle testing shall be carried out piece by piece according to NB/T 47013.4; level I is qualified. pipe x thread size code of branch pipe is DN600xNPT12, is marked as: Manufacturer name or trademark AF

11 Product number or raw material melting furnace number XSx3000 DN600xNPT12
 THD-ELB-OL Example 3: The flat-end extended branch outlet fitting, which has a material class LF485K2, impact test temperature of -50 °C, wall thickness class of trunk pipe x branch pipe of Sch160 xSch160, nominal size of trunk pipe x branch pipe of DN40xDN25, is marked as: Manufacturer name or trademark LF485K2 S050 Product number or raw material smelting furnace number Sch160xSch160 DN40xDN25 PE-NIP-OL Example 4: The flange branch outlet fitting, which has a material class SF2507, trunk pipe wall thickness class x flange pressure class of STDxCLASS300, trunk pipe nominal size x flange nominal size of DN80xDN50, flange sealing surface code RF, flange standard number GB/T 9124.2, is marked as: Manufacturer name or trademark SF2507 Product number or raw material smelting furnace number STDxCLASS300 DN80xDN50 RF-GB/T9124.2 FLG-OL Example 5: The butt-welded thin-walled branch outlet fitting, which