



VAST LINK INTERNATIONAL CO., LIMITED

Stainless Steel Pipe Fittings Handbook

PRODUCT TECHNICAL HANDBOOK

Thin-Wall Press-Fit & Grooved Fittings · Industrial-Grade Grooved Couplings

Applicable materials: 304 / 304L / 316 / 316L austenitic stainless steel

Part I: Thin-wall press-fit & grooved fittings (DN15–DN300, PN ≤ 1.6 MPa)

Part II: Industrial-grade grooved couplings & press systems (up to 600 psi)

Compiled: 2026-09-14

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01 Product Overview

This product series consists of thin-wall stainless steel water pipes and press-type (double-press) fittings, for stainless piping systems with nominal size $\leq$ DN300 and nominal pressure $\leq$ 1.6 MPa, conveying purified drinking water, domestic potable water, cold/hot water, seawater, gas and medical gas. After the pipe is inserted into the fitting socket equipped with a sealing ring, a dedicated press tool applies pressure; the jaws close instantly to complete the joint — a physical "cold extrusion" connection with no welding, threading or open flame.

Double-Press Connection Technology

The double-press connection uses a physical "cold extrusion" process: after pressing, the fitting and pipe form a hexagonal (hex) locking shape giving excellent pull-out resistance; the double-crimp structure compresses the sealing ring radially and on the end face, forming a double seal — safe and reliable for high-rise and demanding applications.

One press · ~4 s forming

An electro-hydraulic press tool drives the jaws closed; the crimp takes only ~4–5 s — no ageing or post-processing.

Permanent joint · can be buried

The crimped joint is permanent like welding yet faster and simpler; it can be buried underground or exposed.

02 Features & Material Selection

01 Easy installation

Insert pipe into gasket-equipped fitting, crimp with a dedicated tool; jaws close instantly.

02 Low labor intensity

No complex threading or welding post-treatment; quality follows work instructions.

03 No fire source

No open flame on site; no hot-work permit or fire-watch required.

04 Clean construction

No cutting fluids, thread accessories or flux; additives and side effects eliminated.

05 Lightweight piping

Thin-wall supply pipe carries larger flow; weight advantage pronounced in high-rise installs.

06 Corrosion resistant · long life

Lifespan matches the building; chromium-oxide film regenerates after mechanical damage.

07 Leak-free · impact resistant

Double-press burst pressure > 10 MPa; smooth bore resists scaling and gives low flow resistance.

08 Healthy · eco-friendly

Health-grade material, 100% recyclable and water-safe; used in medical and food industries.

Comparison: S30408 (304) vs S31603 (316L)

Item	S30408 Stainless Pipe	S31603 Stainless Pipe
Composition	7.93 g/cm ³ ; Cr 18%, Ni 8%	8.03 g/cm ³ ; Cr 16–18%, Ni 10–14%, Mo 2%
Corrosion resistance	Excellent general; very good under civil chloride	Adds molybdenum; superior, tolerates chloride and harsh duty
Price	Usually cheaper	Usually more expensive
Grade	06Cr19Ni10 (AISI 304)	022Cr17Ni12Mo2 (AISI 316L)

Application: cold/hot water, gas, medical gas where corrosion resistance is required; coastal, high-humidity or strongly corrosive duty favors 316L.

03 Materials, Chemistry & Standards

Material Grades and Uses

Unified No.	Grade	Use
S30408	06Cr19Ni10 (AISI 304)	Cold/hot water, purified drinking water, drainage
S30403	022Cr19Ni10 (AISI 304L)	Same as above (low-carbon)
S31608	06Cr17Ni12Mo2 (AISI 316)	Hot water or where corrosion resistance > 304
S31603	022Cr17Ni12Mo2 (AISI 316L)	Same as above (low-carbon)
S11972	019Cr19Mo2NbTi (ferritic 444)	Seawater, high-chloride media

Chemical Composition (%)

Grade	C	Si	Mn	P	S	Ni	Cr	Mo
06Cr19Ni10 (304)	≤0.08	≤0.75	≤2.00	≤0.040	≤0.030	8.00–11.00	18.00–20.00	—
022Cr17Ni12Mo2 (316L)	≤0.03	≤0.75	≤2.00	≤0.040	≤0.030	10.00–14.00	16.00–18.00	2.00–3.00

Physical & Mechanical Properties

Grade	Tensile (MPa)	Elongation Long. / Trans. (%)
06Cr19Ni10 (304)	≥ 520	≥ 35 / ≥ 25
022Cr17Ni12Mo2 (316L)	≥ 480	≥ 35 / ≥ 25

Surface condition: A — pickled & passivated; B — polished (either optional).

Applicable Standards & Specifications

Standard No.	Title	Applies To
GB/T 19228.1 / .2 / .3	Stainless press fittings; thin-wall pipe for press fittings; rubber O-ring	Product / Seal
GB/T 12771	Welded Stainless Steel Pipe for Fluid Conveying	Pipe
CJ/T 151 / 152	Thin-wall stainless water pipe; thin-wall press & grooved fittings	Product
EN 10312	Welded Stainless Pipe for Water & Aqueous Liquids	Product (EU)
AS 5200.053	Pressure-rated Stainless Steel Pipe (Plumbing & Drainage)	Product (AU)
GB/T 17219 / GB 5749	Drinking-water equipment safety / water quality standard	Sanitary

04 Pipe Dimensions & Chloride Limits

Basic Dimensions (I / II Series)

Nominal	DN	Pipe OD (mm)		OD Tol. (mm)	Wall t (mm)	Wall Tol.	Conn.
		Series I	Series II				
DN15	15	16	15.88	±0.10	0.8	±10%	Press
DN20	20	20	22.22	±0.11	1.0	±10%	Press
DN25	25	25.4	28.58	±0.14	1.0	±10%	Press
DN32	32	32	34	±0.17	1.2	±10%	Press
DN40	40	40	42.7	±0.21	1.2	±10%	Press
DN50	50	50.8	48.6	±0.26	1.2	±10%	Press
DN65	65	76.1	—	±0.38	2.0	±10%	Press
DN80	80	88.9	—	±0.44	2.0	±10%	Press
DN100	100	101.6	—	±0.54	2.0	±10%	Press
DN125	125	133	—	±0.99	2.5	±10%	Grooved
DN150	150	159	—	±1.19	3	±10%	Grooved
DN200	200	219	—	±1.64	3	±10%	Grooved
DN250	250	273	—	±2.05	4	±10%	Grooved
DN300	300	325	—	±2.44	4	±10%	Grooved

All nominal pressures ≤ 1.6 MPa. DN15–DN100 use press connection; DN125–DN300 use grooved connection.

Allowed Chloride Content in Conveyed Water

Grade	Cold Water (≤40°C) mg/L	Hot Water (>40°C) mg/L
304 / 304L	≤ 200	≤ 50
316 / 316L	≤ 1000	≤ 250
019Cr19Mo2NbTi (444)	≤ 1000	≤ 1000

05 Sealing & Leak-Proof Technology

Upgraded EPDM Ring · No Leaks

Little affected by ozone, sunlight, weather; resistant to alkali and chemicals; service range $-30^{\circ}\text{C} \sim +130^{\circ}\text{C}$; suitable for long-term drinking-water use.

Long Life

Resists ageing under varied water temperatures; stable long-term in water.

Double Anti-Miss-Press (Fool-proof) Technology

- **Anti-miss-press color strip:** every product carries a miss-press indicator strip — an unpressed joint is visually identifiable for immediate re-pressing.
- **Fool-proof sealing ring:** in leak testing water at 0.1–0.6 MPa, an unpressed joint sprays from the gap or leaks, with an obvious measurable pressure drop.

Storage & handling: store packaged in dry, clean, non-corrosive environment; handle with care (no impact, throwing or dragging); keep pipe ends and ring U-groove free of soil/oil; transport stacked layer-by-layer, covered against rain.

06 Fitting Product Range

Press fittings cover DN15–DN300 with more than 1,000 joint types (custom available). DN125–DN300 additionally offer a grooved series.

Straight Couplings (Press) & Tees & Elbows (Press)

Code	Type	Sizes
S / SR	Equal / Reducing straight coupling	DN15–100 (reducer DN20×15 ~ DN100×80)
SF / SM	Female / Male threaded straight	DN15×1/2" ~ DN50×2"
SK / SL	Adjustable coupling / Flange union	DN15–100
C	Cap	DN15–100
45E / 90E	45° / 90° elbow (with seat)	DN15–100
90EM / 90EF / 90ER	Male / Female / Reducing 90° elbow	DN15×1/2" ~ DN50×2"; reducer DN20×15 ~ DN100×80
3T / 3TR / 3TRP	Equal / Reducing / Eccentric tee	DN15–100 (reducer DN20×15 ~ DN100×80)
3TF / 3TM	Int./Ext.-thread tee	DN15×1/4" ~ DN50×2"

Grooved Series (DN65–DN300)

Type	Variants	Sizes
Grooved straight	Equal / Reducer / Press-reducer	Equal DN65–300; reducer DN80×65 ~ DN300×250
Grooved elbow	90° / 45°	DN65 / 80 / 100 / 125 / 150 / 200 / 250 / 300
Grooved tee	Equal / Reducer	Equal DN65–300; reducer DN80×65 ~ DN300×250
Flange straight / Coupling	—	DN65–300

Manifolds

- **Conventional type**
- **Double-threaded type** — branch with dual threaded ports for hoses and angle valves.
- **Split type** — left/right split distribution for central-supply branch lines.
- Main body + multi-branch ports; branches customizable.

07 Installation Tools & Steps

Press tools: electric-hydraulic, separated hydraulic, and manual types; matching jaws cover DN15–DN100.

Tool	Range	Force	Cycle	Min. clearance
Electric-hydraulic (DN10–50)	DN10–50	32 kN	~4 s	15 mm
Electric-hydraulic (DN15–60)	DN15–60	32 kN	~5 s	15 mm
Small manual	DN15–25	—	—	40 mm
Medium manual	DN32–50	—	—	70 mm
Large manual	DN65–100	—	—	70 mm

Accessories: cutter, deburrer, marker, dedicated gauge, jaw sets per size. **Jaw care:** wipe clean, keep crimping face debris-free, apply anti-rust oil periodically; return for dimensional check after 12 months.

Seven-Step Installation

#	Step	Key points
1	Cut	Confirm length; use dedicated cutter; avoid high-heat tools.
2	Deburr	Remove inner/outer burrs to avoid scraping the seal.
3	Mark	Mark insertion depth to prevent under-insertion.
4	Check seal	Check ring for contamination; wipe socket/pipe end clean (no water/oil).
5	Insert	Insert slowly to the mark; no forced/tilted insertion.
6	Press	Fit fitting arc into jaw recess; keep jaw perpendicular; press to close.
7	Confirm	Use dedicated gauge to verify crimp quality.

Safety: keep hands away from jaws; never stand in the jaw line of fire; never raise max pressure arbitrarily; never service under pressure; electrical repairs by certified electricians.

08 Pipeline System Requirements

Pipe Supports (mm)

DN	10–15	20–25	32–40	50–65	80–125	150–200
Horizontal	1000	1500	2000	2500	3000	3500
Vertical	1500	2000	2500	3000	3500	4000

Ref. GB/T 29038. Prefer stainless or PVC-steel supports lined with rubber/plastic; avoid iron supports or isolate with non-conductive material.

Pipe Compensation (Thermal Expansion)

Stainless thermal expansion coefficient 17.3×10^{-6} mm/mm·°C, $\Delta L = \alpha \cdot L \cdot \Delta t$. Expansion per 10 m vs. ΔT :

ΔT (°C)	10	20	30	40	50	60	70	80	90	100
Expansion (mm/10m)	1.7	3.4	5.2	6.9	8.6	10.4	12.1	13.8	15.5	17.3

Below DN32 prefer natural compensation by bends (free arm, Z, П, loop); DN32+ may use bellows or sleeve joints.

Buried Piping

Scenario	Requirement
Direct soil burial	Non-corrosive soil may be direct-buried; road/river crossing needs a sleeve. 304 usable <200 ppm chloride, 316 <1000 ppm; above that wrap anti-corrosion tape (½ overlap).
Concrete / wall embed	Not poured integrally into concrete; use anti-corrosion protection or clad pipe. Threaded/flange/union joints not allowed for indoor embed.

09 Grooved Connection (DN125 – DN300)

DN125–DN300 large-diameter pipe uses grooved (coupling) connection: pipe cutting → groove by grooving machine → joint assembly.

Stainless Grooved Joint Groove Dimensions (mm)

DN	D _w	t	A±0.5	B (0/–0.5)	C (+0.5/–0)	D.I.
125	133	2.5	16	12.5	3	(127)
150	159	3	16	12.5	3	(153)
200	219	3	19	12.5	3	(213)
250	273	4	19	12.5	3	(267)
300	325	4	19	12.5	3.5	(318)

Nominal pressure ≤ 1.6 MPa. Grooving machine must have a limiter preventing over-deep grooves. **Material note:** grooved coupling may be stainless or ductile iron; if ductile iron, use a rubber/plastic liner between coupling and stainless pipe wall.

10 Pressure Testing, Standards & QC

Test Parameters

System	Hydrostatic Test	Pneumatic Test
Cold / Hot water	Max = 1.5× working; max 2.4 MPa; min 0.8 MPa	Max 0.6 MPa; min 0.25 MPa
Pass criterion	Stable 10 min, drop <0.01 MPa; or 60 min, drop <0.05 MPa	Rest 60 min, drop <0.035 MPa

Note: concealed work must be hydrostatically tested before concealment; after testing put into use or empty test water promptly; after disinfection flush thoroughly.

Quality & Factory Inspection

- **In-process (IQC/IPQC):** incoming plates tested per heat; in production: hydro, air-tight, vacuum, flow, axial pull-out, plus burst and torsion.
- **Finished control:** fitting outgoing — appearance, tolerance, crimp strength, air-tightness, flow, burst, vibration, hydro, axial pull-out.
- **Outgoing criteria:** single-piece hydro test ≤ 2.5 MPa without leakage = pass; each product ships with inspection and quality certificate, batch-traceable.

11 Industrial Grooved Couplings

The grooved mechanical system joins stainless pipe through "grooving (roll or cut groove) + coupling + gasket", replacing welding, threading and flanging. This section covers rigid and flexible couplings, flange adapters and grooved-end fittings for 304 / 304L / 316 / 316L austenitic stainless pipe, in NPS, metric (DN) and JIS dimensions.

Note: grooved-end fitting bodies are 316 stainless (ASTM A351/A743/A744 grade CF8M); welded grooved fittings are 304 / 304L (ASTM A312). Working pressure varies with pipe material, wall thickness and size; figures below are maximum rated values.

Rigid Stainless Coupling 316 SS

Heavy-duty rigid coupling minimizing axial/angular deflection; for rigid positioning such as valve connections.

Representative Type 489: 1½"–12" (DN40–DN300), up to 600 psi / 41 bar. Body 316 (CF8M); bolt ASTM F593 Gr.2 (316), nut ASTM F594 Gr.2 (316).

Flexible Stainless Coupling 316 SS

Controlled axial, angular and rotational movement; absorbs vibration, thermal expansion and settlement.

Light Type 475: 1"–4" (DN25–125) & 165.1 mm, 500 psi / 34 bar. Standard Type 77S: 8"–18" (DN200–450), 300 psi / 21 bar.

Flange Adapter 316 SS

Converts a grooved end to an ANSI Class 150 raised-face flange.

Type 441: 2"–6" (DN50–150), 275 psi / 19 bar, body CF8M. Flat flange face must be ground flush; not for tie-rod anchoring or wafer valves.

Large-Profile Rigid Coupling Stainless

For stainless pipe with a directly rolled standard large-profile groove; wedge-key teeth improve assembly.

Type W89: 14"–24" (DN350–600), up to 700 psi / 48 bar (varies with wall thickness).

Grooved-End Fittings (Elbow / Tee / Reducer / Cap)

Item	Description
Types	90° / 45° elbow; equal / reducing tee; concentric / eccentric reducer; cap; mechanical tee / cross
Material	304 / 316 (cast ASTM A351/A743 CF8, CF8M); 304 / 316L (welded ASTM A312)
Size Range	1"–12" (DN25–DN300)
Wall Thickness	Schedule 10 / 10S / 40 (welded)
Dimensional Std.	ANSI B16.9 (consistent with ductile-iron grooved fittings)
Pressure Rating	Follows the coupled coupling rating (lowest-rated component governs)
Drinking Water Cert.	NSF/ANSI 61, NSF/ANSI 372 (lead-free)

12 Gaskets & Temperature Ratings

Grade	Material	Color	Temperature	Service
E	EPDM	Green stripe	-34 ~ +110°C	Hot/cold water, dilute acid, oil-free air, many chemicals
EW	EPDM	Green W	-34 ~ +110°C	Hot/cold water (WRAS/BS 6920, hot drinking water ≤ +65°C)
T	NBR	Orange stripe	-29 ~ +82°C	Petroleum products, oil-laden air, veg./mineral oil
O	FKM	Blue stripe	-7 ~ +149°C	Oxidizing acids, petroleum, halocarbons, hydraulic fluid
L	Silicone	Red stripe	-34 ~ +177°C	Dry heat, hydrocarbon-free air, some chemicals

13 Bolts, Nuts & Torque

Type	Size Range	Nut Spec.	Socket Spec.	Torque Requirement
Type 489	1½"-2½"	—	—	18 ft-lbs / 25 N-m
	3"-4"	5/8" / M16	1 1/16" / 27 mm	45 ft-lbs / 61 N-m
	139.7 mm	3/4" / M20	1 1/4" / 32 mm	75-100 ft-lbs / 100-137 N-m
	5"-12"	7/8"-1" / M22-M24	1 7/16"-1 5/8" / 36-41 mm	85-200 ft-lbs / 115-275 N-m
Type 475	¾"-2½"	3/8" / M10	11/16" / 17 mm	Tighten to metal-to-metal contact
	3"-4"	1/2" / M12	7/8" / 22 mm	
	5"-12"	5/8" / M16	1 1/16" / 27 mm	
Type 77S	8"-18"	7/8"-1 1/8" / M22-M27	1 7/16"-1 13/16" / 36-46 mm	Tighten to metal-to-metal contact
Type W89	14"-24"	1 1/8" / M27	1 13/16" / 46 mm	See product marking

Assembly: tighten all bolts alternately and diagonally until the washer seats metal-to-metal; apply anti-seize to stainless fasteners before assembly.

14 Industrial Press Systems

The press (crimp) system uses a handheld tool to crimp press couplings / fittings / valves onto ASTM A312 stainless pipe, forming a permanent mechanical-interlock joint — flame-free. Main systems: a 500 psi industrial / fire-protection grade (Schedule 10S) and a 200 psi building plumbing / HVAC grade.

500 psi Industrial / Fire-Protection Press System (Schedule 10S)

Type	Name	Material / Pipe	Pressure
Type 597 / 507 / 508	Press Coupling / Slip Coupling	304 / 316 · Sch. 10S	500 psi / 34 bar
560 Series	Elbow / Tee / Cap / Reducer	304 / 316	500 psi / 34 bar
Series 569	3-piece Ball Valve	316 body	400 psi / 28 bar

200 psi Building Plumbing / HVAC Press System

Item	Description
Material	304 / 316 fittings; 316 pipe (ASTM A312, Sch.5 min wall 0.065" / 1.7 mm)
Size Range	½"–4" (13–108 mm)
Working Pressure	max 200 psi / 1378 kPa (test max 600 psi)
Seal	EPDM (factory-installed); 2½"–4" with grip ring + PBT spacer
Leak-before-press	Built-in unpressed detection (leaks if not crimped)

15 Pressure Rating Summary

Product	Type	Material	Size	Max Pressure
Rigid coupling	Type 489	316 (CF8M)	1½–12" / DN40–300	600 psi / 41 bar
Light flexible coupling	Type 475	316 (CF8M)	1–4" / DN25–125	500 psi / 34 bar
Flexible coupling	Type 77S	316 (CF8M)	8–18" / DN200–450	300 psi / 21 bar
Flange adapter	Type 441	316 (CF8M)	2–6" / DN50–150	275 psi / 19 bar
Large-profile rigid	Type W89	Stainless	14–24" / DN350–600	700 psi / 48 bar
Press coupling (ind.)	Type 597 / 507 / 508	304 / 316	½–2" / DN15–50	500 psi / 34 bar
Press ball valve (ind.)	Series 569	316 body	½–2"	400 psi / 28 bar
Press system (building)	316 Press System	304 / 316	½–4" / DN15–108	200 psi / 1378 kPa
Thin-wall press (Part I)	Double-press	304 / 316L	DN15–100	≤ 1.6 MPa (PN)
Thin-wall grooved (Part I)	Grooved	304 / 316L	DN125–300	≤ 1.6 MPa (PN)

Data disclaimer: The technical parameters in this handbook are provided for general technical reference of stainless steel grooved and press fitting products. Values should be confirmed against the latest product data sheet and applicable standards (ASTM / ASME / ANSI / NSF / GB / EN) before selection and installation. Coupling and flange-adapter bodies are stainless steel (CF8M) and are compatible with 304 / 304L / 316 / 316L austenitic stainless pipe.