

ASME BPE TUBING

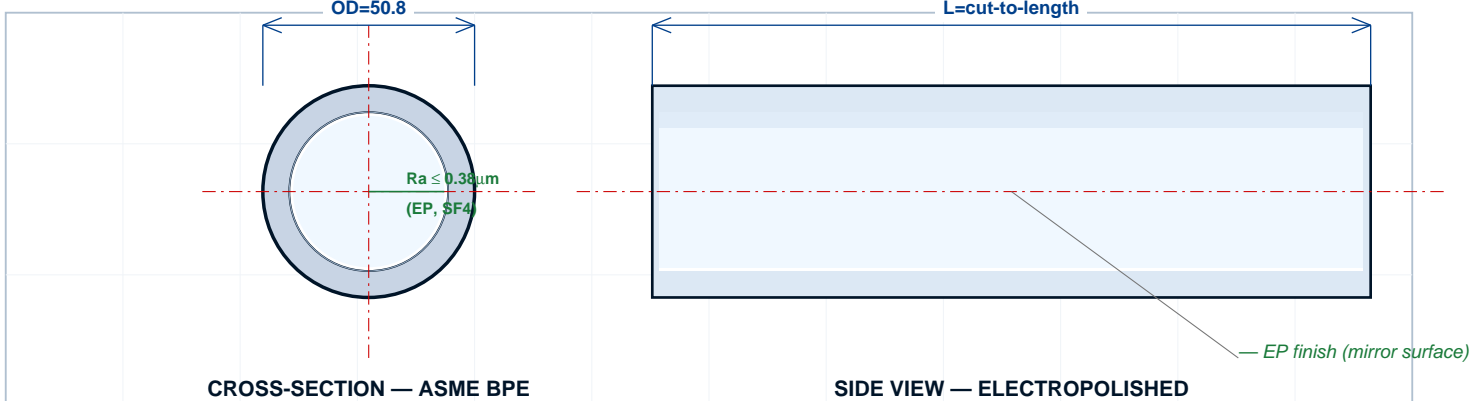
316L ELECTROPOLISHED — PHARMACEUTICAL GRADE

ASME BPE-compliant tubing for pharmaceutical and biotech process applications. Manufactured to the strictest tolerance and surface finish requirements with electropolished internal surface (SF4 designation: $Ra \leq 0.38 \mu\text{m}$). Full material traceability with 3.1 MTR, dimensional inspection reports, surface roughness measurements (profilometer Ra data) and ferrite content verification. Suitable for WFI, purified water, sterile process and high-purity bioprocess applications.

MATERIAL	STANDARD	SURFACE SF4	FINISH	FERRITE	DOCUMENTATION
316L UNS S31603	ASME BPE	$Ra \leq 0.38 \mu\text{m}$	Electropolished	< 1.0%	Full BPE pkg

TECHNICAL DRAWING

DWG: CE-BPE-001



CASPIAN EDGE INC.	
NORTH YORK, ON, CANADA	
DWG NO: CE-BPE-001	SCALE: NTS
UNIT: mm	VIEW: CROSS-SECTION

IN THIS DATASHEET

- PAGE 1** Technical drawing with dimensions and component callouts
- PAGE 2** Full technical specifications, materials and pressure-temperature data
- PAGE 3** Standards compliance, certifications and documentation
- PAGE 4** Applications, installation, maintenance and RFQ form

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DESIGN SPECIFICATIONS

SECTION 1

Standard	ASME BPE-2022
Material	316L (UNS S31603)
Manufacture	Cold-rolled, welded, bright annealed
Surface ID	Electropolished
Surface Designation	SF4 (Ra ≤ 0.38 μm)
Optional	SF5 (Ra ≤ 0.25 μm mirror)
Ferrite Content	< 1.0% (DL designation)
Documentation	BPE-compliant package

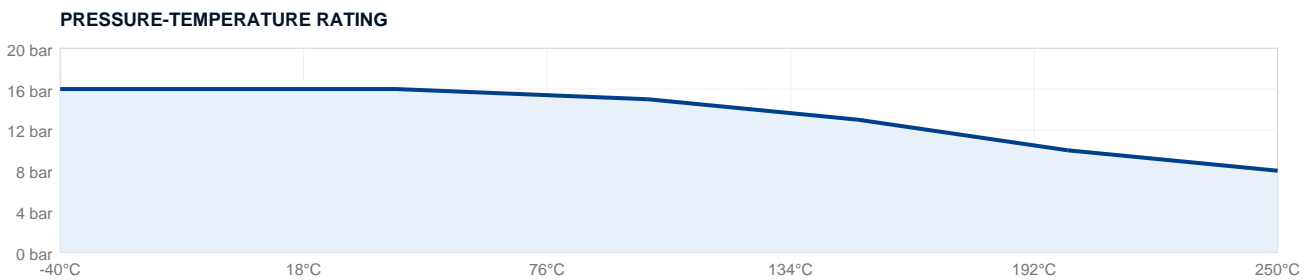
OPERATING CONDITIONS

SECTION 2

PRESSURE RATING		TEMPERATURE RANGE	
Design Pressure	16 bar	Continuous	-196 to +400 °C
Steam SIP	3.5 bar	Steam SIP	+135 °C typ
Hydrotest	1.5xWP bar	WFI Service	+80 to +85 °C circulation
Vacuum	Full bar	Cryogenic	-196 °C min

PRESSURE-TEMPERATURE RATING CHART

SECTION 3



SURFACE FINISH OPTIONS

SECTION 4

DESIGNATION	RA (MM)	RA (MIN)	METHOD	APPLICATION
Standard	≤ 0.8	≤ 32	Mechanical polish	Food, dairy, beverage
Premium	≤ 0.5	≤ 20	Mech. polish + buff	Pharmaceutical
EP (BPE SF4)	≤ 0.38	≤ 15	Electropolish	Biotech, high-purity
Mirror	≤ 0.25	≤ 10	EP + final buff	Critical bioprocess

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MATERIALS OF CONSTRUCTION

SECTION 5

ELEMENT	SYMBOL	MIN %	MAX %	BPE NOTE
Chromium	Cr	16.5	18.0	Tighter range
Nickel	Ni	11.0	14.0	Tighter range
Molybdenum	Mo	2.0	3.0	Standard
Carbon	C	—	0.03	L grade
Sulfur	S	0.005	0.017	BPE controlled range
Phosphorus	P	—	0.030	Tighter than A270
Nitrogen	N	—	0.10	Restricted
Ferrite	—	—	1.0	% by volume (DL)

316L CHEMICAL COMPOSITION

SECTION 6

ELEMENT	SYMBOL	MIN %	MAX %	FUNCTION
Chromium	Cr	16.0	18.0	Corrosion resistance
Nickel	Ni	10.0	14.0	Ductility, toughness
Molybdenum	Mo	2.0	3.0	Pitting resistance
Carbon	C	—	0.03	Low carbon (L grade)
Manganese	Mn	—	2.0	Deoxidizer
Silicon	Si	—	0.75	Deoxidizer
Phosphorus	P	—	0.045	Impurity (limit)
Sulfur	S	—	0.030	Impurity (limit)

SIZE CHART & DIMENSIONS

SECTION 7

NOM.	OD (MM)	WT (MM)	TOLERANCE OD	TOLERANCE WT	LENGTH (M)
½"	12.70	1.245	±0.13	±0.15	6.00
¾"	19.05	1.651	±0.13	±0.15	6.00
1"	25.40	1.651	±0.13	±0.15	6.00
1½"	38.10	1.651	±0.13	±0.15	6.00
2"	50.80	1.651	±0.13	±0.15	6.00
2½"	63.50	2.108	±0.13	±0.20	6.00
3"	76.20	2.108	±0.13	±0.20	6.00
4"	101.60	2.108	±0.13	±0.20	6.00

STANDARDS & CERTIFICATIONS

SECTION 8

STANDARD	DESCRIPTION	STATUS
ASME BPE-2022	Bioprocessing Equipment	Compliant
ASTM A270 S2	Pharma supplementary	Compliant
ASME BPE MT-9	Inspection & testing	Compliant
ASTM A967	Passivation	Compliant
ASTM A380	Cleaning & passivation	Compliant
ISO 15510	Stainless chemical compositions	Compliant

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TYPICAL APPLICATIONS

SECTION 9

PHARMA & BIOTECH

- WFI distribution
- Purified water systems
- API manufacturing
- Bioreactor connections
- Sterile filling
- Process skids

BIOPHARMA

- WFI distribution loops
- Purified water (PW) systems
- Mammalian cell culture
- Microbial fermentation
- Vaccine production
- Monoclonal antibodies

DAIRY

- Pasteurization circuits
- Cheese processing
- Yogurt production
- Milk separators
- Cream lines
- 3-A compliant systems

INSTALLATION GUIDELINES

SECTION 10

Receiving & Storage: Maintain protective end caps until installation. Store horizontally on padded supports in clean enclosed area. Verify MTR documentation matches material. **Cutting:** Use cold-cutting methods only (orbital saw with cutting oil). Never use abrasive wheel cutting. Deburr inside and outside edges after cutting. **Orbital Welding:** Required for BPE compliance. Use automated orbital weld heads with full argon purge (>99.997% pure) inside and outside. Weld discoloration must be within ASME BPE acceptance criteria. **Passivation:** After fabrication and pressure testing, passivate per ASTM A967 (typically nitric acid + DI water rinse). Test for chloride residue (<5 ppm) and surface finish verification. **Documentation:** Maintain full traceability: MTR (heat numbers), weld maps, Ra surface measurements (3 readings per joint), riboflavin test results, passivation records.

MAINTENANCE SCHEDULE

SECTION 11

INTERVAL	ACTION	NOTES
Daily	System pressure log	Verify no pressure decay
Weekly	Rouge inspection	Visual check for surface discoloration
Monthly	CIP effectiveness	TOC, conductivity, microbial sampling
Quarterly	Surface Ra spot-check	Profilometer at sample points
Annually	Passivation review	Re-passivate if rouge accumulation
Per protocol	Riboflavin retest	Drainability verification

REQUEST A TECHNICAL QUOTATION

Send your specifications and we will respond with detailed pricing, lead time and documentation.

INCLUDE IN YOUR RFQ:

Quantity · Size (DN) · Material grade · Seal material · Surface finish · Required certifications · Delivery date

[SUBMIT RFQ →](#)

caspianedge.com/rfq