

1.0 PURPOSE AND SCOPE

This specification establishes the engineering specifications applicable to high purity stainless steel ball valve manufacturing processes.

This specification applies to Evans BA/SG/SV Series ball valve manufacturing unless dictated by specific customer requirements.

2.0 GAS SPECIFICATIONS

Argon (Liquid)	
Grade:	Ultra Pure
Oxygen:	1 ppm, maximum
Moisture:	1 ppm, maximum
Total hydrocarbons:	0.5 ppm, maximum
Purity:	99.999%, minimum

Helium (Liquid)	
Grade:	Ultra Grade
Composition:	Helium
Oxygen:	5 ppm, maximum
Moisture:	3.5 ppm, maximum
Purity:	99.997%, minimum

Nitrogen (Liquid)	
Grade:	Ultra Pure
Oxygen:	1 ppm, maximum
Moisture:	1 ppm, maximum
Total hydrocarbons:	0.5 ppm, maximum
Purity:	99.999%, minimum

3.0 MATERIALS OF CONSTRUCTION

Ball Valve Body	
Ball, Stem	316SS, CF8M
Body	ASTM A351 CF8M, CF8
Seats, Stem Packing, Thrust Washer	RTFE/TFM 1600
End Cap:	CF3M, CF3
Bolts, Handles, Nuts, Washers	304 SS
Handle Cover	Plastic

Tubing: Domestic 316L seamless or welded seam (depending on size) construction, cold drawn bright annealed, sulfur content controlled to 0.005 to 0.017%	
OD – 1 in. and larger	ASTM A269, ASTM A270
OD – ½ in. and ¾ in.	ASTM A269, ASTM A213
OD – less than ½ in.	ASTM A269, ASTM A632
ID Finish No. 180 Grit	25 Ra, max; 8" > 50 Ra, max
Final ID Cleaning	Ultrasonic cleaned in a Cleanroom
Certification	<ul style="list-style-type: none"> • Physical/chemical characteristics • Cleaning compliance
Optional: Copper Tubing (valve sizes 3"- up only, refer to BR Series for smaller sizes with copper extensions)	
Seamless Copper Water Tube	ASTM B88

4.0 WELDING SPECIFICATIONS

Weld atmosphere	Inert gas (argon)
Porosity:	None allowed
Inspection:	100% with no discoloration

5.0 CLEANING SPECIFICATIONS

Pre-Heated Deionized Water	
Usage:	100% of all ball valve components
Resistivity:	18 Megohms–cm minimum

Hobart Pre-Washer in Cleanroom

Usage:	100% of all ball valve components
Time (wash):	4-6 minutes
Time (rinse)	1 minute
Rinse agent:	18 MGH DI water

Crest Ultrasonic Cleaning System in Cleanroom	
Usage:	100% of all ball valve components
Cleaning agent:	Valtron Sp2555 Surfactant
Tanks:	1 wash, 1 pre-rinse, 1 rinse
Time (wash):	5 minute, minimum
Time (rinse)	5 minute, minimum
Tank temperature:	150 degrees F minimum
Filtering:	0.5 to 0.1 micron (sequential)
CFOS Cleaning:	Conforms to CGA G 4.1

Blow Down with Nitrogen in Cleanroom	
Usage:	Ball valve components
In-line N ₂ Filtration:	0.01 micron

6.0 AIR OVEN DRYING SPECIFICATIONS

Environment:	Clean Room
Usage:	100% of all ball valve components
Temperature:	100 degrees C
Time:	30 minutes, minimum

7.0 PARTICLE TEST SPECIFICATIONS

Environment:	Clean Room
Static test:	Counts less than 30 particles per cubic foot, greater than 0.1 micron and less than 10 particles per cubic foot greater than 0.5 micron

8.0 TESTING SPECIFICATIONS

Leybold UL 400 Helium Leak Detector Test	
Environment:	Clean Room
Usage:	100% of all ball valve components
External agent:	Helium
Helium detection device:	Mass spectrometer
Device resolution:	0.1 ($\times 10^{-x}$ scc/sec)
Leak Test Specification:	1×10^{-7} scc/sec, minimum across the seat, outboard/inboard

Pressure Decay Leak Test	
Usage:	Upon customer requirement
Applied pressure:	100 psig-120 psig ball open 100 psig-120 psig across seat
Pressure agent:	Nitrogen
Application time:	30 seconds
Measuring device:	Magnehelic differential pressure
Device resolution:	0.1 inch
Specification:	Less than 0.5 inch per application time

9.0 FINAL INSPECTION REQUIREMENTS

Visual inspection	100% of all ball valves
Dimensional check	100% of all ball valves
Final N2 Blowdown	100% of all ball valves
Capping and bagging	100% of all ball valves
Tubing Certification	100% of all ball valves
Certification of Conformance	Provided upon request

Reviewed and Approved by:

See Record of Procedure Review on File in Master Binder

Revision History

Rev	Description of Changes	Author & date
0	Original issue.	John Rudnick 3/15 /00
1	Total reformatting into tables for ease of use, correction in Met One A2100 Plus Laser Particle Counter usage per J Crowley.	M. Buser 3/1/01
2	Added Hobart information to section 6.0.	D. Loprinzi 6/10/01
3	Updated manufacturing and design information	GBP 03/13/06
4	Updated manufacturing and design information	C. Evans 05/13/11
5	Updated inboard/outboard He Leak Test Data	C. Evans 10/28/13
6	Updated inboard/outboard & material specs	C. Evans 04/07/14