

Stainless Steel Seamless Tubes AP/BA/EP



Fine Stainless Steel Seamless AP Tubes

for Instrumentation & High Tech Application

Features (특징)

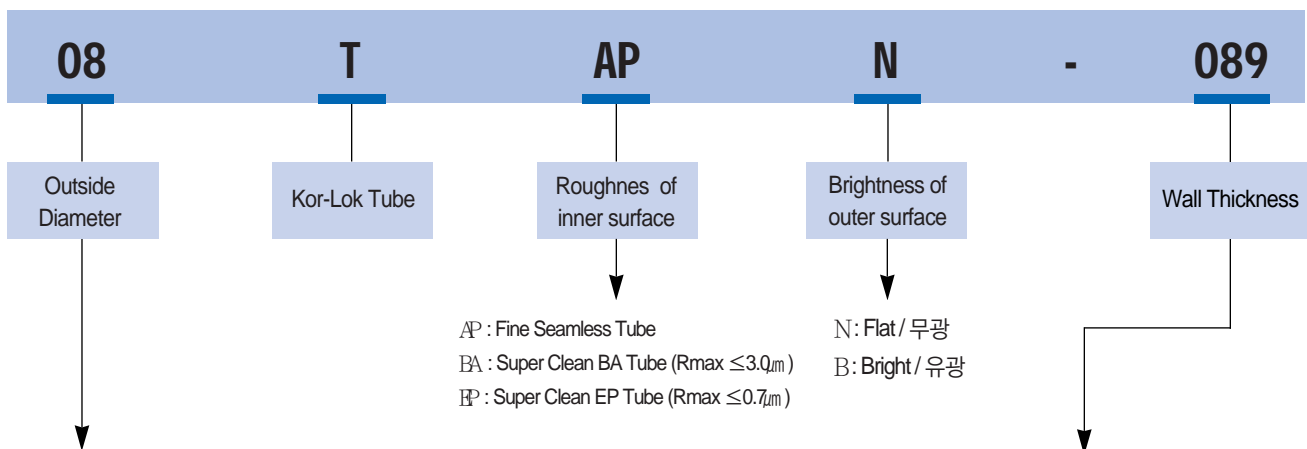
- Made of high quality raw materials
- Strict control of tolerances in outside diameter as well as wall thickness in accordance with ASTM A269
- Extra fine surface in both outside and inside
- Excellent internal roughness according to state of the art technology
- Fully bright annealed for outstanding corrosion resistance
- Exact hardness for proper tubing
- 고품질의 스테인레스 스틸을 모재로 사용
- ASTM A269에 따른 외경 및 두께의 허용공차에 대한 철저한 관리
- 최신 생산기술 및 철저한 관리에 따른 튜브 내외면의 뛰어난 조도
- Bright Annealed 방식에 의한 뛰어난 내압성
- 배관작업에 용이한 경도

Materials

- ASTM A213/A269 TP316/TP316L

How to Order

- Kor-Lok Tubes are ordered by part number a shown index.
- Nomenclature for Tubes



Tube O.D Designation

Tube O.D	Inch	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1
	mm	3.17	4.76	6.35	7.93	9.52	12.70	15.87	19.05	22.22	25.40
Designation		2	3	4	5	6	8	10	12	14	16
Tube O.D(mm)		6	8	10	12	15	16	18	20	22	25
Designation		M06	M08	M10	M12	M15	M16	M18	M20	M22	M25

Wall Thickness Designation

Designation	089	124	165	211
mm	0.89	1.24	1.65	2.11
inch	0.035	0.049	0.065	0.085
Designation	100	150	200	250
mm	1.00	1.15	2.00	2.50

■ Note : Brightness of outer surface is adopted for AP tubes only. In case of BA/EP tubes are ultra precision bright surface.
(튜브외경 광택의 선택은 AP 튜브에만 적용되며, BA/EP 튜브의 경우는 유광으로 공급됩니다.)

Standard Specification/AP Tubes

Fractional(Inch) Size

Part No.	Outside Diameter		Wall Thickness		Weight Kg/m	Working Pressure(bar) / Temperature(°c)				
	inch	mm	Inch	mm		@20°c	@100°c	@200°c	@300°c	@400°c
02TAPN -071-SS	1/8	3,18	0,028	0,71	0,059					
04TAPN -089-SS	1/4	6,35	0,035	0,89	0,122	309	242	203	182	167
04TAPN -124-SS	1/4	6,35	0,049	1,24	0,159	496	389	326	292	269
06TAPN -089-SS	3/8	9,53	0,035	0,89	0,193	198	155	130	117	107
06TAPN -124-SS	3/8	9,53	0,049	1,24	0,257	310	243	204	183	168
08TAPN -089-SS	1/2	12,70	0,035	0,89	0,263	146	114	96	86	79
08TAPN -124-SS	1/2	12,70	0,049	1,24	0,356	226	177	149	133	122
08TAPN -165-SS	1/2	12,70	0,065	1,65	0,456	327	256	215	192	177
10TAPN -124-SS	5/8	15,88	0,049	1,24	0,454	178	139	117	105	96
12TAPN -124-SS	3/4	19,05	0,049	1,24	0,553	146	115	96	86	79
12TAPN -165-SS	3/4	19,05	0,065	1,65	0,720	209	164	137	123	113
16TAPN -165-SS	1	25,40	0,065	1,65	0,982	153	120	101	90	83
16TAPN -211-SS	1	25,40	0,085	2,11	1,232	205	161	135	121	111

• In case of flat surface, add B instead of N (유광의 경우, N대신 B표기)

Metric Size

Part No	Outside Diameter	Wall Thickness	Weight	Working Pressure(bar)/Temperature(°c)				
	mm	mm	Kg/m	@20°c	@100°c	@200°c	@300°c	@400°c
M06TAPB-100-SS	6	1,0	0,125	390	306	256	230	211
M08TAPB-100-SS	8	1,0	0,175	281	221	185	166	153
M10TAPB-100-SS	10	1,0	0,225	220	173	145	130	119
M12TAPB-100-SS	12	1,0	0,275	181	142	119	107	98
M12TAPB-150-SS	12	1,5	0,394	308	241	202	181	167
M15TAPB-150-SS	15	1,5	0,507	240	189	158	142	130
M16TAPB-150-SS	16	1,5	0,544	224	176	147	132	121
M18TAPB-150-SS	18	1,5	0,619	197	155	130	116	107
M20TAPB-200-SS	20	2,0	0,901	251	196	165	148	136
M22TAPB-200-SS	22	2,0	1,000	226	177	149	133	122
M25TAPB-200-SS	25	2,0	1,150	197	154	129	116	107
M25TAPB-250-SS	25	2,5	1,410	251	196	165	148	136

• In case of flat surface, add N instead of B (유광의 경우, B대신 N표기)

• Basic length per unit is 6 meter. Other Size Tubes / Roll Tubes / Welded Tubes are also available upon request.
(한본당 길이는 6미터 입니다. 상기에 기재되어 있지 않은 규격의 튜브, 롤튜브, 용접형튜브도 공급 가능합니다.)

※ Note : Above information shown in above table are theoretical and reference only.
(상기 정보는 이론적인 데이터이며, 참조용입니다.)

Super Clean & Ultra Precision Seamless BA/EP Tubes

for Semiconductor & Display



In advanced technology areas such as semiconductor equipment and ultra high vacuum equipment, high quality and a high degree of cleanliness are extremely important requirements for the parts of manufacturing equipment.

SUPER CLEAN SEAMLESS EP TUBES are manufactured using "PRIMET", a material in which the impurities have been reduced to the absolute minimum and nonmetallic inclusions and gas components have been reduced to the minimum possible.

This tube meets the requirements for ultra high purity gas supply lines such as internal smoothness, cleanliness, improved corrosion

resistance and reduced gas and particle emission from the metal. Thus, the tubes make a major contribution to improving performance of the semiconductor manufacturing equipment process.

최신의 생산 기술 및 최상의 품질이 요구되는 반도체 및 디스플레이 산업에서는 제조 설비 및 장비에 사용되는 부품에 대한 완벽한 진공 및 청정도가 가장 중요한 요소로 인식되고 있습니다. uni-primet® EP Tube는 가스 및 비금속성 성분의 유입을 방지하기 위해 일본 다이토사의 VIM/VAR로 생산되어 내면 조도 및 청정도, 튜브의 가스 및 입자의 방출을 최소화하여 고순도 가스가 사용되는 반도체 및 디스플레이 생산 설비 및 장비의 성능에 최적의 조건을 제공합니다.

Guaranteed Levels of Chemical Components in (uni-primet® 소재의 화학조성)

Chemical Components : Wt%	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	Al	N*	O*	H*
PRIMET Guaranteed Levels in Manufacturing Stage	≤ 0,010	≤ 0,30	≤ 0,40	≤ 0,030	≤ 0,030	≤ 0,25	14,50 ~ 15,00	16,50 ~ 17,00	2,20 ~ 3,00	≤ 0,010	≤ 150	≤ 15	≤ 2,0
PRIMET Actual Levels in Manufactured Product	0,005	0,05	0,25	0,020	0,001	0,17	14,57	16,91	2,23	<0,002	64	5	1,3
PRIMET - VIM/VAR Guaranteed Levels in Manufacturing Stage	≤ 0,010	≤ 0,026	≤ 0,05	≤ 0,020	≤ 0,002	≤ 0,25	14,50 ~ 15,00	16,50 ~ 17,00	2,20 ~ 2,50	≤ 0,010	≤ 150	≤ 15	≤ 2,0
Japanese Standard JIS G3459 SUS316LTP	≤ 0,030	≤ 1,00	≤ 2,00	≤ 0,040	≤ 0,030	—	12,00 ~ 15,00	16,00 ~ 18,00	2,00 ~ 3,00	—	—	—	—
USA Standard ASTM A269 TP316L	≤ 0,035	≤ 0,75	≤ 2,00	≤ 0,040	≤ 0,030	—	10,00 ~ 15,00	16,00 ~ 18,00	2,00 ~ 3,00	—	—	—	—

Comparison of Cleanliness of uni-primet® Tube and General AP Tube

(uni-primet® EP Tube와 일반 AP Tube의 청정도 비교)

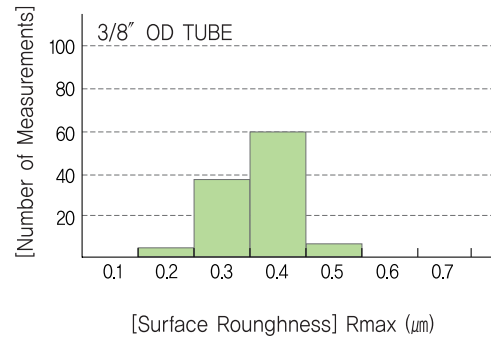
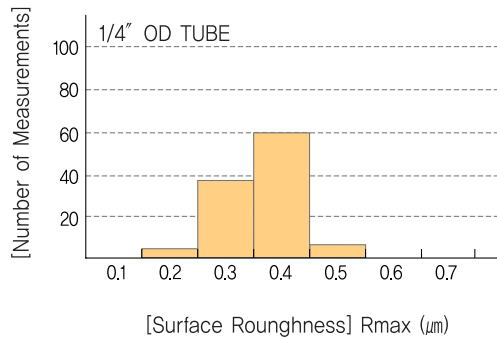
Measurement Method Type of Steel	JIS Method (TOTAL)				ASTM Method				
	0,02	0,04	0,06	0,08	0,5	1,0	1,5	2,0	2,5
PRIMET	█				█				
JIS 316L	█	█	█		█	█	█	█	█

Guaranteed Level of Internal Roughness (uni-primet® 의 내면조도)

External 3.18mm ≤ OD ≤ 12.70 : ≤ Rmax 0.5μm Ave.

Diameter 12.70mm < OD ≤ 25.40 : ≤ Rmax 0.7μm Ave.

Internal Roughness Statistics (내면 조도)



Electro-Polishing (BA와 EP 튜브 비교)



BA Tube Surface x300



BA Tube Surface x1000



EP Tube x300

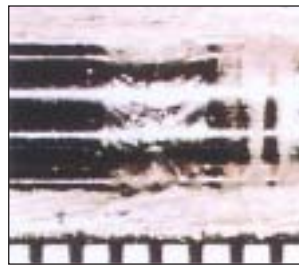


EP Tube x1000

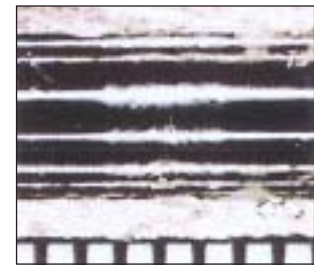
Weldability (uni-primet® 소재와 일반 316L의 용접성 비교)



Std.316L (1.6%Mn)



uni-primet® (0.3%Mn)



uni-primet®-VIM/VAR (0.05%Mn)

Quality Assurance System (uni-primet® 품질관리체계)

• uni-primet® Tubes are subjected to the quality tests listed below. (uni-primet® Tube는 다음의 품질 보증 시스템에 의하여 생산됩니다.)

1. First Material Tests

- Analysis of Chemical Constituents
- Analysis of Nonmetallic Inclusions
- Mechanical Property Test
- Ultrasonic Flow Detection Examination
- Inspection of Appearance and Dimensions

2. Second Material Tests

- Internal Quality Test
- Permeability Test
- Hardness Test

3. First and Second Product Test

- Internal Roughness Measurement Tests
- Inspection of Appearance and Dimensions

4. Third Product Tests

- Internal Roughness Measurement Test
- Inspection of Appearance and Dimensions
- Moisture Measurement Test
- Oiliness Measurement Test

5. Fourth Product Tests

- The following tests are implemented at the request of customers
- ESCA : Electron Spectroscopy for Chemical Analysis.
 - AES : Auger Electron Spectroscopy
 - Corrosion Test
 - Internal Surface Pitting Measurement
 - Elusion Ion Measurement
 - Micro/Macro Tests
 - Particle Measurement Test

Standard Specification/BA Tubes

Part No.	Outside Diameter	Wall Thickness	Tolerance		Roughness
	mm(inch)	mm	O.D.(mm/inch)	W.T.	
04TBA-100	6.35 (1/4)	1.00	±0.07 / ±0.003	±10%	Rmax 3.0 _{μm} (Ra 12'')
06TBA-100	9.53 (3/8)	1.00			
08TBA-100	12.70 (1/2)	1.00	±0.10 / ±0.004		
08TBA-124	12.70 (1/2)	1.24			
10TBA-124	15.88 (5/8)	1.24			
12TBA-124	19.05 (3/4)	1.24	±0.12 / ±0.005		Rmax 4.0 _{μm} (Ra 16'')
12TBA-165	19.05 (3/4)	1.65			
16TBA-165	25.40 (1)	1.65			

- Basic length per unit is 4 meter. Other Size Tubes are also available upon request.
(한본당 길이는 4미터 입니다. 상기표에 기재되어 있지 않은 규격의 튜브도 공급 가능합니다.)

Standard Specification/uni-primet® EP Tubes

Part No.	Outside Diameter		Wall Thickness		Length		Roundness
	mm (inch)	Tolerance	Mm	Tolerance	mm	Tolerance	
02TEP-071	3.18 (1/8)	+0.05 -0.00	0.71	±0.05	2,000	+0.05 -0.00	1/1000
04TEP-100	6.35 (1/4)		1.00	±0.05	4,000		
06TEP-100	9.53 (3/8)	+0.06 -0.00	1.00	±0.05	4,000		
08TEP-100	12.70 (1/2)	+0.07 -0.00	1.00	±0.05	4,000		
08TEP-124	12.70 (1/2)		1.24	±0.05	4,000		
12TEP-124	19.05 (3/4)	+0.09 -0.00	1.24	±10%	4,000		
12TEP-165	19.05 (3/4)		1.65	±10%	4,000		
16TEP-165	25.40 (1)	±0.10	1.65	±10%	4,000		

- Basic length per unit is 4 meter. Other Size Tubes are also available upon request.
(한본당 길이는 4미터 입니다. 상기표에 기재되어 있지 않은 규격의 튜브도 공급 가능합니다.)

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Technical Information

Comparison of Chemical Composition

Code	Standard		CHEMICAL COMPOSITION								
			C	Si	Mn	P	S	Ni	Cr	Mo	OTHER
304	JIS	SUS 304	0,080 ^{max}	1,00 ^{max}	2,00 ^{max}	0,040 ^{max}	0,030 ^{max}	8,00-11,00	18,00-20,00	-	-
	AISI	304	0,080 ^{max}	1,00 ^{max}	2,00 ^{max}	0,045 ^{max}	0,030 ^{max}	8,00-10,50	18,00-20,00	-	-
	ASTM	TP 304	0,080 ^{max}	0,75 ^{max}	2,00 ^{max}	0,040 ^{max}	0,030 ^{max}	8,00-11,00	18,00-20,00	-	-
	DIN	X5CrNi189 Nr.1,4301	0,070 ^{max}	1,00 ^{max}	2,00 ^{max}	0,045 ^{max}	0,030 ^{max}	8,50-10,00	17,00-20,00	*	-
304L	JIS	SUS 304L	0,030 ^{max}	1,00 ^{max}	2,00 ^{max}	0,040 ^{max}	0,030 ^{max}	9,00-13,00	18,00-20,00	-	-
	AISI	304L	0,030 ^{max}	1,00 ^{max}	2,00 ^{max}	0,045 ^{max}	0,030 ^{max}	8,00-12,00	18,00-20,00	-	-
	ASTM	TP 304L	0,035 ^{max}	0,75 ^{max}	2,00 ^{max}	0,040 ^{max}	0,030 ^{max}	8,00-13,00	18,00-20,00	-	-
	DIN	X2CrNi189 Nr.1,4306	0,030 ^{max}	1,00 ^{max}	2,00 ^{max}	0,045 ^{max}	0,030 ^{max}	10,00-12,50	17,00-20,00	*	-
316	JIS	SUS 316	0,080 ^{max}	1,00 ^{max}	2,00 ^{max}	0,040 ^{max}	0,030 ^{max}	10,00-14,00	16,00-18,00	2,00-3,00	-
	AISI	316	0,080 ^{max}	1,00 ^{max}	2,00 ^{max}	0,045 ^{max}	0,030 ^{max}	10,00-14,00	16,00-18,00	2,00-3,00	-
	ASTM	TP 316	0,080 ^{max}	0,75 ^{max}	2,00 ^{max}	0,040 ^{max}	0,030 ^{max}	11,00-14,00	16,00-18,00	2,00-3,00	-
	DIN	X5CrNiMo1810 Nr.1,4301	0,070 ^{max}	1,00 ^{max}	2,00 ^{max}	0,045 ^{max}	0,030 ^{max}	10,50-13,50	16,50-18,50	2,00-2,50	-
316L	JIS	SUS 316L	0,030 ^{max}	1,00 ^{max}	2,00 ^{max}	0,040 ^{max}	0,030 ^{max}	12,00-16,00	16,00-18,00	2,00-3,00	-
	AISI	316L	0,030 ^{max}	1,00 ^{max}	2,00 ^{max}	0,045 ^{max}	0,030 ^{max}	10,00-14,00	16,00-18,00	2,00-3,00	-
	ASTM	TP 316L	0,035 ^{max}	0,75 ^{max}	2,00 ^{max}	0,040 ^{max}	0,030 ^{max}	10,00-15,00	16,00-18,00	2,00-3,00	-
	DIN	X2CrNiMo1810 Nr.1,4404	0,030 ^{max}	1,00 ^{max}	2,00 ^{max}	0,045 ^{max}	0,030 ^{max}	11,00-14,00	16,50-18,50	2,00-2,50	-

Proper Selection of Tubes / Tube의 올바른 선택

1. Use the guaranteed tubes for proper tubing and complete sealing performance as the surface and the tolerance of outside diameter of tubes are very important factors.
2. The materials of tubes are more soft than the tubes.
3. When the material of tubes is the same as tube fittings, the heat treated tubes shall be used.
4. Kor-Lok Insert (UI) shall be used together with PVC, PTFE, PFA tubes for the sealing.

1. Tube의 표면처리 상태 및 외경 크기는 Tube Fitting의 올바른 체결 및 배관의 밀폐에 대단히 중요한 요소이므로 반드시 검증된 Tube를 사용하여야 합니다.
2. Tube는 Tube Fitting의 재질보다 연질이어야 합니다.
3. Tube와 Tube Fitting이 동일 재질인 경우 Tube는 열처리 된 것을 사용하여야 합니다.
4. PVC, PTFE, PFA Tube와 Tube Fitting 체결시 배관의 밀폐를 위하여 반드시 Insert를 사용하여야 합니다.

Benefits for using Tubes than Pipes / Tube의 장점

1. Using Tubes is easier than Pipes in assembling and dissembling.
2. Using Tubes is economical and time saved than Pipes as tubes are lighter and easy to bend
3. Using Tubes is providing the complete sealing performance than piping as the ferrules and nuts are guaranteed the complete tightening.

1. Tube는 Pipe보다 체결 및 분리가 훨씬 용이합니다.
2. Tube는 Pipe보다 가볍고 절곡등이 쉬워 취급 및 배관작업이 용이함으로 시간이나 비용면에서 경제적입니다.
3. Tube Fitting의 Ferrule 및 Nut의 작용에 의한 밀폐성이 뛰어나며 절곡이 용이하여 체결부위가 적어 Tube는 Pipe보다 누설위험이 적습니다.



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