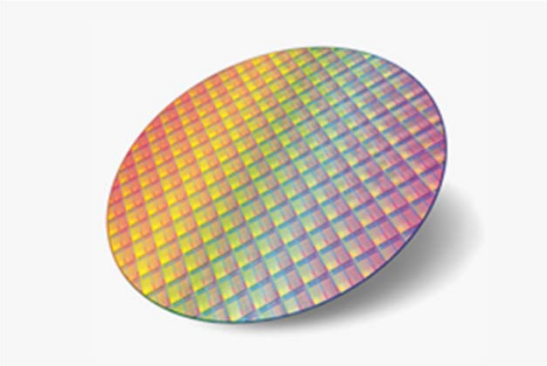


WSG

Ultra High-Purity 超高纯度
High-Precision 高精准度
Heat Transfer 传播热量
Instrumentation 仪器仪表
Process Piping 工艺管道

Total Solution Provider 整体解决方案供应商



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Company History（公司历史）

1998
Incorporated（公司成立）

2008
Developed A269/A270-TP316L (low-titanium) Ultra High Purity tubing for Samsung Electronics
给三星电子开发A269/A270-TP316L（低钛）超高纯度管材

2009
Supplied to Intel, Ireland（成为英特尔（爱尔兰）的供应商）

2010
Supplied to Samsung Electronics, Austin, USA（成为三星电子（美国奥斯汀）的供应商）

2011
Supplied to Tianma Microelectronics & BOE, China（成为天马微电和京东方的供应商）

2012
Supplied to Micron, Singapore（成为镁光（新加坡）供应商）

2013
Supplied to Chartered Semiconductor（成为新加坡特许半导体的供应商）

2015
Supplied to Applied Materials and NASA（成为美国应用材料公司和NASA的供应商）

2017
Supplied to TESLA and Boeing, USA（成为特斯拉公司和波音公司的供应商）

2018
Supplied to TSMC, Taiwan（成为台湾台积电的供应商）
Supplied to GVO, China（成为鑫谷光电（中国）的供应商）
Supplied to Intel, USA（成为英特尔（美国）的供应商）
Supplied to Samsung Electronics, China（成为三星电子（中国）的供应商）



Production Capacity & Service Capabilities (产能及服务)

Products (产品)
Tubes, Pipes, Fittings, Components and Regulators (管道，管件，组件和调节阀)

Product Types (产品类型)
Welded, Welded and Drawn, and Seamless (焊接的，焊接冷拔的，无缝的)

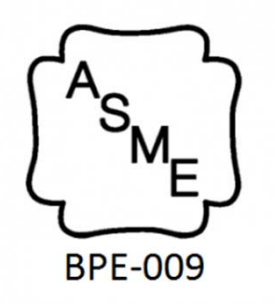
Materials Grade (材质)
304, 304L, 316L, SUS316L, EN1.4435, 32205, 32750, Titanium Gr2, Inconel 825, 625

Production Capacity (per month) 产能 (每月)
Welded 1200 tons (焊接的1200吨)
Seamless 120 tons (无缝的120吨)

Production & Supply Range (产品范围)
OD 1.0mm ~ 711.2 mm (外径1.0毫米 ~ 711.2毫米)
WT 0.1mm ~ 12.0mm (厚度0.1毫米~12.0毫米)

Servicing Industries (服务领域)
Semiconductors, Microelectronics, LCD, LED (半导体、微电子、液晶显示屏、发光二极管)
Solar Cells, Biotechnology, Pharmaceuticals (太阳能电池、生物研究实验室、制药)
Linear Motion and Controls, Factory Automation (线性运动和控制、工厂自动化)
Oil & Gas, Chemicals, Power Generation, Desalination, Downhole Services (油气、化工、发电站，海水淡化、井下服务)
Food & Beverages, Sugar Refining Industries (食品、饮料、糖精制行业)
HVAC, Commercial Air Conditioning System, Heat Transfer Industries (暖通系统、商用空调系统、热交换行业)
Hydraulic Cylinder, Pneumatic Cylinder (液压缸、气压缸) Gas Spring, LCD Roller Shaft (气压弹簧、液晶显示屏滚轮轴)
Metal Insulated Cable, Encapsulated Tubing, Pre-insulated Tubing (金属绝缘电缆、封装管道产品、保温管道)
HPLC tubing, Medical Instrument Devices (液相层析仪管件，医疗仪器器材)
Instrumentation Tubing (仪表管道) Process Piping (工艺管道)

Manufacturing Locations (生产基地)
#1 Factory in Busan, Korea (韩国釜山，1号工厂) #2 Factory in Busan, Korea (韩国釜山，2号工厂)
#3 Factory in Nantong, China (中国南通，3号工厂) #4 Factory in Changzhou, China (中国常州，4号工厂)
#5 Factory in Zhangjiagang, China, planned (中国张家港，5号工厂，计划中)



Accreditation & Patent (认证和专利)

1998
ISO9001
ISO14001

2007
Patent on ID Polish Method (内抛光工艺专利权)
Patent on ID Polish Equipment (内抛光设备专利权)

2008
3A Certified for Food & Beverages, Pharmaceutical Industries
(3A证书，食品、饮料、制药行业使用)

2010
AD2000 W2 & PED Welded (焊管)
AD2000 W2 & PED Seamless (无缝管)
WPS qualified operators (WPS合格操作工)

2012
Patent on Welded Hollow Bar Tubing (中空棒管材专利权)

2015
IATF (TS 16949) for automotive industries (汽车制造业IATF (TS 16949)

2016
ASME BPE for biotechnology and pharmaceuticals (生物工程和制药行业ASME BPE证书)

2018
Selected as Global Leader by Korea (被韩国选中作为行业全球领导者)
JIS Certificate in progress (JIS证书，正在审核)



Management (管理)

CCO (董事长, 首席客户官)
Victor Kang 康基庸
New Product Development,
Customer Resource Management

CEO (首席执行官)
John Lim
Legal & Compliance (法务，公司治理)
Management Strategy

COO (质量经理)
DY Shin
QMS. Production System
LEAN, Continuous Process Improvement

CTO (首席技术官)
KM Lee
Engineering & Production

CFO
YD Goh
Management Administration
Finance & Accounting

QMS
JP Seo
Quality Controls & Inspection

Information System, Director
JM Ryu
ERP

Sales, Vice President
YG Roh
Semiconductors & Microelectronics
Previously from KC Tech Group

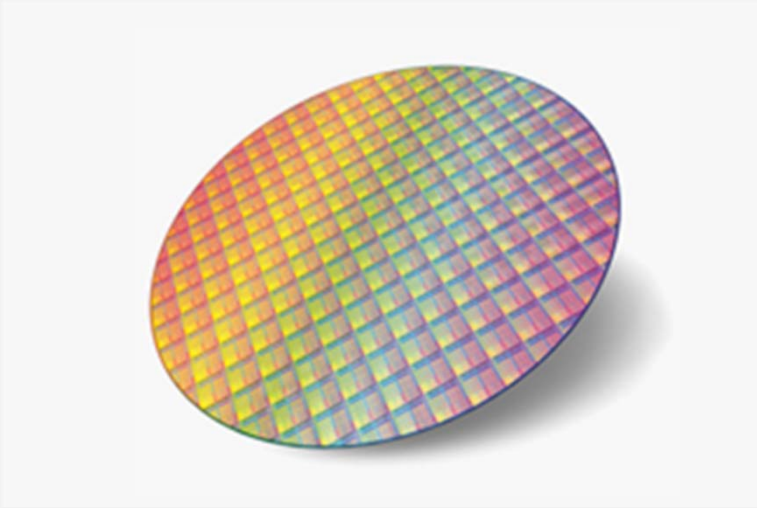
Sales, Vice President
Biotechnology & Pharmaceuticals
DH Shin
Sartorius, Korea

Sales, Director
YH Kim
Supply and Chain Management

R&D, Technology
Patrick Russell, Director
Previously with Trent Tube

High Purity Solution

高纯度解决方案





UHP Product Portfolio
(超高纯度产品系列)

EP (电解抛光产品)
Seamless, 316L, ID 10RA, ID 5RA (无缝)
Seamless, 316L VIM/VAR, ID 5RA (无缝)
Welded, 316L, ID 10RA (焊接)
Co-Axial Tube (同轴管)

BA (光亮退火产品)
Seamless, 316L, ID 15RA (无缝)
Welded, 316L, ID 15RA (焊接)
Precision Cleaned (精密清洁)

MP (机械抛光)
Welded, 304L, ID 15RA (焊接)
Precision Cleaned (精密清洁)

AP (固溶酸洗)
Seamless, 304L, 316L, ID 32RA (无缝)
Welded, 304L, 316L, ID 32RA (焊接
Precision Cleaned (精密清洁)

Vacuum Tube (真空管)
Seamless, 304L, 316L, ID 32RA (无缝)
Welded, 304L, 316L, ID 32RA (焊接)

Large OD pipes (大口径管道)
Seamless, ID 15RA (无缝)
Welded, ID 15RA & 10RA (焊接)
PE coating service provided (聚乙烯涂层服务)

Fittings (管件)
Seamless (无缝)
Welded (焊接)

End-Users
(终端客户)

Samsung Electronics, Korea	三星电子（韩国）
Samsung Electronics, Austin, USA	三星电子（美国）
Samsung Electronics, China	三星电子（中国）
Intel, Ireland	英特尔（爱尔兰）
TSMC, Taiwan	台积电（台湾）
Applied Materials, Singapore	应用材料（新加坡）
Micron, Singapore	镁光（新加坡）
Micron, USA	镁光（美国）
Hynix, Korea	海力士（韩国）
Tesla, USA	特斯拉（美国）
Global Foundry, USA	全球芯片加工服务商
LG Displays	LG显示器
Samsung OLED	三星OLED
GVO, China	鑫谷光电（中国）
Seoul Semiconductor	首尔半导体
Donghoo Finechem	东友精细化学株式会社
Woongjin Polysilicon	熊津多晶硅
Chartered Semiconductors	特许半导体
OSRAM	欧斯朗



ASME BPE Products
(产品系列)

SF4
Seamless, 316L (S:0.005%~0.017%), ID 15RA (无缝)
Electro-polished (电解抛光)
Cr/Fe controlled (铬，铁控制)

Welded, 316L (S:0.005%~0.017%), ID 15RA (焊接)
Electro-polished (电解抛光)
Cr/Fe controlled (铬，铁控制)

SF1
Seamless, 316L (S:0.005%~0.017%), ID 20RA (无缝)
Welded, 316L (S:0.005%~0.017%), ID 20RA (焊接)

SF0
Seamless, 316L (S:0.005%~0.017%), Bright Annealed
(无缝) 光亮退火

Welded, 316L (S:0.005%~0.017%), Bright Annealed
(焊接) 光亮退火

End-Users
(终端客户)

Samsung Biologics (三星生物制剂)
Eli Lilly, Ireland (礼来制药，爱尔兰)
Alexion Pharmaceuticals, Ireland (亚力兄制药，爱尔兰)
LFB Technologies, France (LFB 科技，法国)
Glaxo Smith Kline, Hungary (葛兰素史克，匈牙利)
Richter Gedeon, Hungary (吉瑞特大药厂，匈牙利)
Procter & Gamble (宝洁)
Pfizer (辉瑞)
Merck Sharp & Dohme (默克)
Novartis (诺华公司)
Baxter Healthcare (百特健康)
Abbot Laboratory (强生实验室)
Roche (瑞士罗氏)
Alcon (爱尔康)
Allergan (艾尔健)
Kimberly Clark (金伯利)
AMGEN (安进)
Boehringer Ingelheim (勃林格殷格翰公司)
Bristol-Myers Squibb (百时美施贵宝)
Genzyme (健赞公司)
LEO (利奥)
MSD (默沙东)
Novo Nordisk (诺和诺德)
Sanofi (赛诺菲)
Schering-Plough (先灵葆雅)
Hospira, Australia (赫士睿) (澳大利亚)
CSL, Australia (杰特贝林) (澳大利亚)
Astra Zeneca, Australia (阿斯利康) (澳大利亚)
Hanmi Pharmaceuticals (韩美制药)
LG Life Sciences (LG生命科学)
Korea Green Cross (绿十字)
Aprogen
Pollus
Celtrion
SK Plasma



Sanitary & Hygienic Products
(卫生级 & 洁净级产品)

3A
Seamless, ID 20RA, OD Polished 32RA
无缝, ID 20RA, OD 32RA 外抛光
Welded, ID 20RA, OD Polished 32RA
焊接, 内表面 ID 20RA, OD 32RA 外抛光

KS D 3585
Welded, ID 0.5 µm, OD Polished 0.5 µm
焊接, 内表面 ID 0.5 µm, 外抛光 OD 0.5 µm

JIS G 3447
Welded, ID 0.5 µm OD Polished 0.5 µm
焊接, 内表面 ID 0.5 µm, 外抛光 OD 0.5 µm

AS1528.1
Welded, ID Bead Removed OD Polished 0.8 µm
焊接, 内整平, 外抛光 OD 0.5 µm

EN10357 / DIN11850
Welded, ID Bead Removed & Pickled (CC)
焊接, 内整平, 酸洗 (CC)
Welded, ID Bead Removed & Pickled, OD Polished (CD)
焊接, 内整平, 酸洗,外抛光 (CD)
Welded, ID Bead Removed & Bright Annealed (BC)
焊接, 内整平, 光亮退火 (BC)
Welded, ID Bead Removed & Bright Annealed, OD Polished (BD)
焊接, 内整平, 光亮退火, 外抛光 (BD)

End-Users
(终端用户)

Pepsi Cola (百事可乐)
Coca Cola (可口可乐)
Coca Cola, Korea (可口可乐, 韩国)
Kraft Foods (卡夫食品)
Unilever (联合利华)
Nestle (雀巢)
Dannon Yogurt (达能酸奶)
Chobani Yogurt (乔巴利酸奶)
Dreyer's Ice Cream (德雷尔冰淇淋)
Ocean Spray (优鲜佩)
Leprino (奶普利乐)
Emmi Roth Cheese (艾米罗斯奶酪)
Morinaga Dairy Japan (森永乳业, 日本)
San Miguel Beer (生力啤酒)
Korea Tobacco & Ginseng (韩国烟草人参公社)
Amore Pacific (爱茉莉太平洋)
LG Chemical (LG化学)
OB Beer (OB啤酒)
Seoul Dairy (首尔乳业)
Maeil Dairy (万朝乳业)
Pulmuone Sparkling Water (圃美多苏打水)
Samdasoo Water (三多水)
Cosvision (科斯威晨)
Nongshim (农心)
Haitai Confectionery (海太制果株式会社)
LG Healthcare (LG医疗保健)
CJ (CJ集团)
Lotte Chilsung (乐天七星)
Hankuk Yakult (韩国益力多)
Sampyo Soy Sauce (三波酱油)
Dongah Pharmaceuticals (东亚制药)



Fitting and Components
(管件和组件)

UHP (超高纯度)
Seamless, 316L, ID 10RA, ID 5RA (无缝)
Seamless, 316L VIM/VAR, ID 5RA (无缝)
Welded, 316L, ID 10RA (焊接)
Co-Axial Tube (同轴管产品)

ASME BPE (生物工艺设备)
Seamless, SF1. SF4 (无缝)
Welded, SF1, SF4 (焊接)

Vacuum Components (真空组件)
Seamless, BA, BAP (无缝，光亮，光亮酸洗)
Welded, BA, BAP (焊接，光亮，光亮酸洗)

3A
Seamless, ID 20RA, OD 32RA (无缝)
Welded, ID 20RA, OD 32RA (焊接)

AS1528.1
Welded, ID Bead Removed, OD 32RA (焊接，内整平，外表面OD 32RA)

DIN11850
Welded, in execution of CC, CD, BC, BD (焊接，CC, CD, BC, BD 标准执行)

KS D3585/A270
Welded, MP (焊接，机械抛光)

JIS G3447
Welded, MP (焊接，机械抛光)

End-Users
(终端用户)

Samsung Biologics (三星生物制品)
Richter Gedeon (吉瑞大药厂)
Glaxo Smith Kline (葛兰素史克)
Laurel (劳雷尔)
CSL Pharmaceuticals (CSL 制药)
Hospira, Australia (赫士睿) (澳大利亚)
Astra Zeneca, Australia (阿斯利康)
OSRAM (欧司朗)
Chobani Yogurt 乔巴尼酸奶)



Cleaning Services
(清洁产品)

CEP
Electro-polish (电解抛光)
Precision Cleaning (精密清洁)

CPC
Precision Cleaning (精密清洁)

CFOS
Cleaning for Oxygen Services (清洁氧气服务)

CWC
CREST Wash Cleaning (CREST 清洗清洁)

TCC
Thermocouple Cleaning (热电偶清洁)

DPC
Dry Pigging Cleaning (干燥清洁)

CCC
CREST Commercial Cleaning (CREST 化学清洁)

High Precision Solution

高精度解決方案





Linear Motion & Controls
(线性运动和控制)

Pneumatic Cylinders (气缸)
Welded and Drawn (焊接+冷拔)
304 Material Grade (304 材质)
ID H9 tolerances with 0.4 µm Finish
(内表 H9 公差, 0.4 µm 粗糙度)
Hardness & Mechanical Properties Controlled
(硬度和机械性能控制)

End-Users
(终端客户)

FESTO (费斯托)
Emerson (艾默生)
SMC (智邦科技)
Parker Taiyo (太阳铁工)
Bansbach (班斯巴赫)
Samsung Electronics, China (三星电子, 中国)
LG Displays (LG 显示器)
Samsung OLED (三星有机发光显示器)

Bi-Directional Pneumatic Cylinders (双向气缸)
Welded and Drawn (焊接+冷拔)
316L & 304L
ID H9 tolerances with 0.4 µm (内表 H9 公差, 0.4 µm 粗糙度)
OD h9 tolerance with 0.4 µm (外表 h9 公差, 0.4 µm 粗糙度)
Hardness & Mechanical Properties Controlled (硬度, 机械性能控制)

Gas Springs (气弹簧)
Seamless (无缝)
316L & 304L
Hardness Controlled to the range of HRB 90~110 (硬度控制范围 HRB 90~110)

LCD Roller Shaft (液晶显示屏滚动轴)
Welded and Drawn (焊接+冷拔)
316L & 304L
OD h9 tolerances (外径 h9 公差)

Printer Roller Shaft (打印机滚动轴)
Welded and Drawn (焊接+冷拔)
316L & 304L
OD h8 tolerances (外径 h8 公差)



Material Insulated Cables
(材料绝缘电缆)

Metal Insulated Cable (材料绝缘电缆)
Seamless Coils (无缝盘管)
Welded and Drawn Coils (焊接冷拔盘管)
Material Grades (材质)
304, 321, 310S, 310H
Inconel 825, 600, 601, 625 (铬镍铁合金)

Encapsulated Cable (封装电缆)
Seamless Coils (无缝盘管)
Welded and Drawn Coils (焊接冷拔盘管)
Material Grades (材质)
316L, Inconel 825, 625 (铬镍铁合金)

Pre-Insulated Cable (预绝缘电缆)
Seamless Coils (无缝盘管)
Welded and Drawn Coils (焊接冷拔盘管)
Material Grades (材质)
304L, 316L, 316L 2.5%-moly, EN1.4435
Inconel 825, 625 (铬镍铁合金)

End-Users
(终端用户)

S-Oil (双龙)
GS Caltex (加德士)
Shell (壳牌石油)
Petronas (佩享那弛)



Medical Devices
(医疗器材)

HPLC (High Performance Liquid Chromatography) (高效液相色谱法)
Seamless, 316L, EP ID 8RA, ID 10RA
(无缝, 316L, 电解抛光, 内表面 ID 8RA, 内表面 ID 10RA)
Seamless, 316L, BA ID 15RA
(无缝, 316L, 光亮退火, 内表面 ID 15RA)

Surgical Devices (手术器材)
Welded and Drawn (焊接+冷拔)
Seamless (无缝)
Hardness Controlled (硬度控制)
Straightness Required (直度要求)

Metric Tubing (公制管道)
Seamless (无缝的)
Welded and Drawn (焊接+冷拔)

Hypodermic Tubing (注射器管道)
Seamless (无缝)
Welded and Drawn (焊接+冷拔)

End-Users
(终端用户)

Johnson and Johnson
(约翰森和约翰森)



Automotive Applications
(汽车应用)

EGR Cooler Tube (废气冷却用管)
Welded and Drawn (焊接+冷拔)
316L

EGR Pipe Assembly (废气管装配)
Welded and Bellows (焊接+冷拔)
Bending (弯曲)
Brazing (硬钎焊)
304

EGR Inlet & Outlet Tubes (废气进气口和排气口管道)
Welded (焊接)
Expansion (胀管)
304

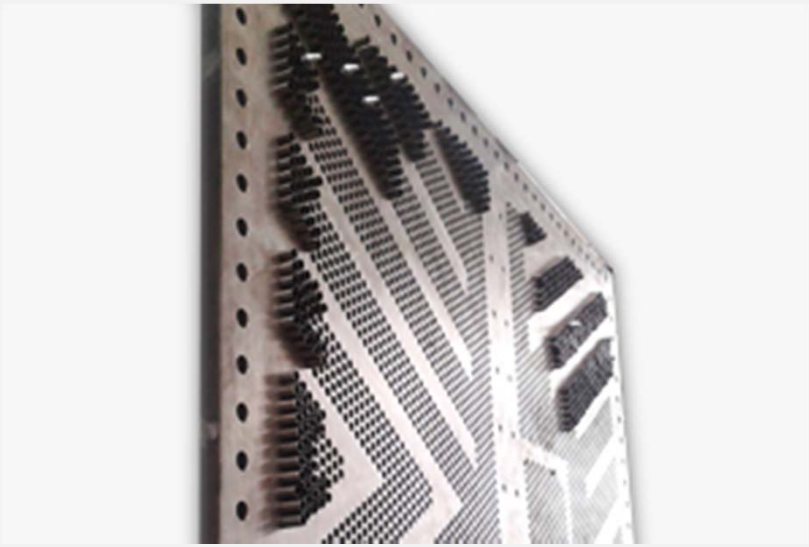
Gasoline Reducer Pipe (汽油变径管)
Welded (焊接)
Reducer (变径)
304

End-Users
(终端用户)

BMW (宝马)
Ford (福特)
Peugeot (标致)
Hyundai Motors (现代汽车)
Kia Motors (起亚汽车)
Ssangyong Motors (双龙汽车)
GM Korea (通用汽车韩国)
Renault Samsung (雷诺三星)

Heat Transfer Solution

热交换解决方案





Heat Exchanger Tubes
(热交换器管)

Condenser (冷凝器)
Welded, 316L, OD 1.0" (焊管)
Welded, Titanium Grade-2, OD 1.0" (钛焊管)

Feed-water Heater (给水管)
U-Tubes, OD 5/8" (U型管)
Seamless (High-Pressure) 0.109" wall (无缝, 高压)
Welded (Low-Pressure) 0.035" wall (焊接. 低压)

Air-Cooled Heat Exchanger (空冷热交换器)
Seamless (无缝)
Welded (焊接)
304L, 316L

Absorption Chiller (吸收式冷冻器)
Welded (焊接) Seamless (无缝)
436L, 430J1L

Falling Film Evaporator (降膜式蒸发器)
Welded (焊接)
304, 439

Gas Dehydrator (天然气脱水器)
Welded (焊接)
304, 316L

Hydrogen Cell Power Generator (氢电池电力发电机)
Welded (焊接)
304L, 310S, C22, C276

Heat Exchanger (热交换器)
Seamless (无缝) Welded (焊接)
304L, 316L, 321, 304N, 304H, S31803/S32205/S32750, 410S, T11, T12, T22, SA179, Cu-Ni

End-Users
(终端用户)

GE (通用电气)
GE & Oil (通用电气和石油)
Sulzer (苏尔寿公司)
Lyondell Bassett (利安德巴)
Alstom (阿尔斯通)
Korea Hydro and Nuclear Power (韩国水电和核电)
Kuwait Electricity and Water (科威特水电)
NSRP, Viet Nam (越南 NSRP)
Marafiq (马拉菲克)
Jeddah, Saudi Arabia (沙特阿拉伯, 吉达)
Sohar, Oman (苏哈, 阿曼)
Power and Water, Yanbu (延布 电力和水)
Abengoa Solar (阿本戈太阳能)
Ashalim, Israel (以色列 阿沙利姆)
Hyundai Petrochemical (现代石油化工)
Kimcheon Combined Cycled Power (金泉联合循环能源)
Pocheon Thermal Power (抱川市火电站)
Kumho Petrochemical (韩国锦湖)

Instrumentation Solution

仪器仪表解决方案





Instrumentation Products
(仪器仪表产品)

Bright Annealed (光亮退火)
Seamless (无缝)
304/L
316/L
NACE MR0175 (美国腐蚀工程师协会 MR0175 标准)
Intergranular Corrosion Test ASTM A262 Practice-E (晶间腐蚀试验)
HRB 80 MAX (硬度小于等于80HRB)

Annealed and Pickled & OD Polished (固溶、酸洗+外抛光)
Seamless (无缝的)
304/L
316/L
NACE MR0175 (美国腐蚀工程师协会 MR0175 标准)
Intergranular Corrosion Test ASTM A262 Practice-E (晶间腐蚀试验)
HRB 80 MAX (硬度小于等于80HRB)

Coiled Tubing (盘管)
Seamless, 100kg equivalent length (无缝, 100公斤管的长度)
316L
316H
304L
316L 2.5%-moly
316L 1.4435

End-Users
(终端客户)

NASA (美国宇航局)
Donghoo Finechem (东友化学精密)
Lotte Chemicals (乐天化学)
Kolon Industries (科隆工业)
Daewoong Pharmaceuticals
Cryolor (东亚制药)

Process Piping Solution

过程管道解决方案





Process Piping
(过程管道)

SA312
Seamless (无缝)
Welded (焊接)
Sch 5, 10, 20, 40
Precision Cleaning (精密清洗)
EP Services Provided (提供电解抛光加工)

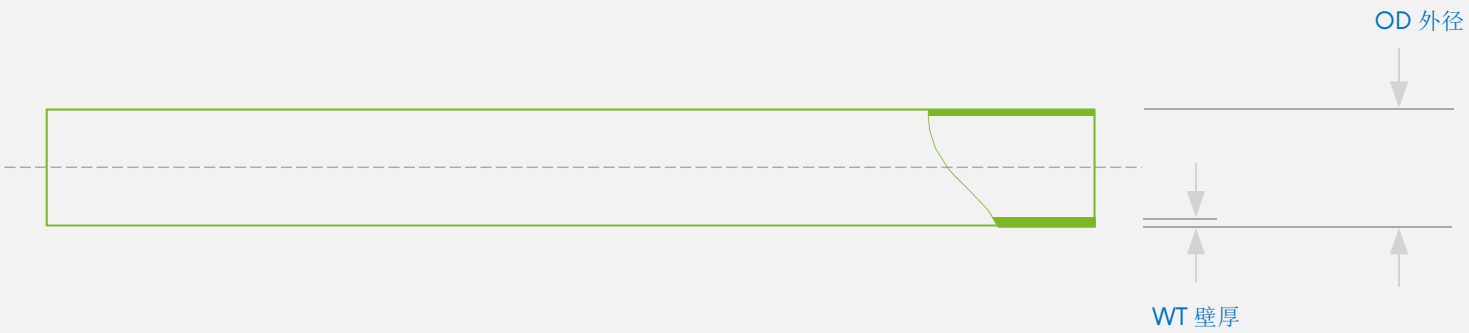
JIS G3459
Seamless (无缝)
Welded (焊接)
Sch 5, 10, 20, 40
Precision Cleaning (精密清洗)
EP Services Provided (提供电解抛光加工)

End-Users
(终端用户)

Samsung Electronics, China (三星电子，中国)
TSMC, Taiwan (台积电，台湾)
GVO, China (鑫谷光电，中国)
Kuwait Electricity & Water (科威特电力水力公司)

Quality Assurance

品质保证





Inspection Procedures and Mechanical Tests (检验流程和力学测试)

	Procedure (流程)	Test Methods (检验方法)	Code Specifications (规范)
1	Incoming Materials Check (进料检验)	Check Mill Sheet (A270.2) (检查板卷)	ASTM A1016/A 1016M
2	Pre-Materials (备料)	Chemical Composition (A270.2) (检查化学成分)	ASTM A1016/A 1016M
3	Free of Weld Slag Check (焊渣检查)	Orbital Weld Test (轨道焊接测试)	EN 10217-7, 7.2.3 (A270.6.1.3)
4	Mill Operation (机台加工)	Complete Bead Removal (焊道去除, 焊缝余高)	EN 10217-7, 7.2.3 (A270.6.1.3)
5	Hydrogen Bright Annealing (氢气光亮退火)	Minimum 1040℃ (最低1040度)	A270.7
6	Non-Destructive Test (无损检测)	EN 10217-7, 7.2.1	A270.11
7	NDT Test (无损检测)	Eddy Current Test (涡流探测) NDT LEVEL II (无损检测II级)	ASTM A1016/A 1016M EN 10246-2, A270.11 EN 10246-3 E1H
8	Mechanical Tests (力学性能测试)	Reverse Flattening (反向压扁)	A270.10.1/A269
9	Mechanical Tests (力学性能测试)	Tensile Test (拉伸试验)	A270-S2.2/A269/A249
10	Mechanical Tests (力学性能测试)	Hardness/Maximum HRB 90 (硬度/最大90HRB)	A270-S2.3/A269/A249
11	Mechanical Tests (力学性能测试)	Flattening (压扁试验)	EN-ISO 8492 /A270-S2.4.1/A249
12	Mechanical Tests (力学性能测试)	Flange (卷边试验)	A270-S2.4.2/A269/A249
13	Mechanical Tests (力学性能测试)	Reverse Bending ASME SA249 (反向弯曲)	S/A249.11.1 and S/A249.13.4
14	Product Analysis (产品分析)	ASME SA249	S/A249.8
15	Pre-Materials (备料)	Sulfur Controlled (0.005%~0.017%) (控硫)	A270-S2.1
16	Material Verification (材料检验)	PMI Checks (元素检验)	A270.8, A270.2
17	Weld Integrity (焊接完整)	Boroscope Checks & Reference to pg #5 (内孔表面检查&参考第5页)	A270.9
18	Ovality (椭圆度)	Micrometer & Ring Test (千分尺检测&响铃测试)	A270.12
19	Wall Thickness (壁厚)	Micrometer (千分尺检测)	A270.12
20	Length & Tube-Ends (长度和管口)	90°Angle-facing & Square Measurement (90度角贴边 & 方形测量)	A270.12
21	Straightness (直度)	Rolling Test (滚动测试)	A270.12
22	Surface Finish (表面处理)	Profilameter (粗糙度检测仪)	A270.13
23	Linemarking (喷码)	According to PO (根据订单要求)	A270.14
24	Packaging & Packing (包装)	ASME BPE Standard (ASME BPE 标准)	A270-S2.6.1
25	Certificate of Test Report (检测报告)	Approved by QA Director (品管主任批准)	A270.4.1.8



Quality Criteria for UHP Products (UHP产品质量标准)

	Indication (指示)	Acceptance Rules (SF1 & SF4)
1	Cluster of Pits (沙眼区域)	None Accepted (不接受)
2	Nicks & Dents (裂痕和凹坑)	None Accepted (不接受)
3	Oxide & Star Burst (氧化和星裂)	None Accepted (不接受)
4	Surface Cracks (表面龟裂)	None Accepted (不接受)
5	Surface Residuals or Particles (表面残留物或微粒残留)	None Accepted (不接受)
6	Weld Porosity (pin-hole) (焊缝气孔) (针孔)	None Accepted (不接受)
7	Visible Residue of Burrs and Debris (毛边或碎片残留)	None Accepted (不接受)
8	Visible Residue of Oil or Stains (油污残留)	None Accepted (不接受)
9	Single Corrosion Spot or Areas (单一腐蚀点或区域)	None Accepted (不接受)
10	Undercut - Longitudinal Weld (底切-纵向焊)	None Accepted (不接受)
11	Lack of Weld Penetration (未焊透)	None Accepted (不接受)
12	Longitudinal Weld Line (纵向焊接线)	Accepted if Ra is met (机械抛光时可接受)
13	Grit Lines (抛光线条)	Accepted if Ra is met (机械抛光时可接受)
14	Surface Inclusions (表面包含物)	Accepted if Ra is met (机械抛光时可接受)
15	Weld Slag – Longitudinal Weld Seam (焊渣-纵向焊缝)	Accepted if 3 per 6 meter length & < 75% width of weld bead (假如6米管有3米小于3/4焊珠的宽度时，是可以接受的)
16	Discoloration (变色)	Accepted if Ra is met and if < 5% of the total areas (如果是机械抛光时,变色区域小于5%是可以接受的)
17	Pits (沙眼)	Accepted if diameter is < 0.02" (0.51mm) and bottom is shiny (假如直径小于0.51mm，沙眼底部是明亮的，则可以接受)
18	Scratches (抓痕)	Accepted if length < 0.25" and depth <0.003" and Ra met (假如长度小于0.25英寸，深度小于0.003英寸，机械抛光，是可以接受的)
19	Water Stains (水渍)	Accepted if no deposits are formed (假如没有沉积物形成，是可以接受的)
20	Orange Peel (桔皮)	Accepted if Ra is met (机械抛光时可以接受)
21	End Grain & Stringer Indication (端面晶粒和纵梁指示)	Accepted if Ra is met (机械抛光时可以接受)
22	Weld Whitening & Fixture Marks (焊道变白和设备印子)	Accepted if Ra is met (机械抛光时可以接受)
22	Haze, Cloudiness, Blistering & Buffing (暗沉，朦胧，起泡，麻皮)	None Accepted (不接受)

Material Test Report（材料检测报告）

CERTIFIED REPORT OF TESTS

per EN 10204 3.1

Notified Body TUV SUD Group ISO 9001: 2015 Cert No TUV100 01 2206
PED 2014/68/EU, Annex I, Section 4.3 and AD-W0 Cert No DGR-0036-QS-W 550/2012/MUC

WSG CREST
1921-16 Gijang-daero, Jangan-eup
Gijang-gun Busan, Korea 46028
TEL:+82-51-710-1700 FAX : +82-51-727-1636

CUSTOMER		CERTIFICATE NUMBER	WS 12011801-02
ORDER NUMBER		ISSUE DATE	18-Mar-2012
INVOICE NUMBER			

PRODUCT TYPE	STAINLESS STEEL WELDED TUBE, BRIGHT ANNEALED, BEAD REMOVED, OD POLISHED	MATERIAL GRADE	TP 316/316L
PRODUCT SIZE	38.1 (mm, OD) X 1.65 (mm, WT) X 6500 (mm, Length)	QUANTITY	1306.5 m
SPECIFICATIONS	ASTM A249	NUMBER OF LENGTHS	201
HEAT TREATMENT	BRIGHT ANNEALED TO MINIMUM OF 1900°F [1040℃], QUENCHED IN INERT GAS	REVISION	ASTM A249-14
SURFACE FINISHES	ID & OD=32 μin.(0.8 μm) Ra MAX		

CHEMICAL COMPOSITION (according to mill certificate of stainless steel mill, %)

HEAT NUMBER	C	Si	Mn	P	S	Cr	Ni	Mo	Cu	Co	N	Cb+Ta
SC42934	0.0158	0.560	1.050	0.027	0.0028	16.44	10.2	2.01	0.184	-	0.0131	-

MECHANICAL TEST

YIELD STRENGTH (0.2% OFFSET)	TENSILE STRENGTH	ELONGATION (%) (50mm)	HARDNESS
MPa 263	MPa 566	53	HRB 77
MPa 275	MPa 571	53	HRB 73

FLANGE TEST	ACCEPTABLE	FLATTENING TEST	ACCEPTABLE	EDDY CURRENT TEST	ACCEPTABLE	DIMENSIONS CHECK	ACCEPTABLE
REVERSE-BEND	ACCEPTABLE	VISUAL INSPECTION	ACCEPTABLE	SURFACE ROUGHNESS ID	Ra 0.48um (19uin)	SURFACE ROUGHNESS OD	Ra 0.4um (16uin)

ATTEST

The Material has not come in contact with mercury or/and low melting point elements. Weld repair was not used to manufacture this product.
The delivered products comply with the requirements of the order.
Eddy current test is conducted according to ASTM A1016/A1016M. Material is PMI-tested on all 100%.
We hereby certify that the material herein has been made and tested in accordance with above specification and the results of all test are acceptable.

33-03 BPE-009

Ingrid Seo — WSG Co., Ltd. QA Manager
Quality Assurance Manager

Jae min Lee
IN-HOUSE INSPECTOR

WS-QP-804-04B (Rev. 5) WSG Co., Ltd. A4(297X210)

Shipping Preparation

发货前准备





Wooden Box Quantities & Line-marking Instruction (木箱数量和唛头 说明)

OD (Diameter) 外径		WT (Wall Thickness) 壁厚		Length 长度	Wooden Box Quantities 一木箱能容纳的数量		
inch 英寸	Mm 毫米	inch 英寸	Mm 毫米	mm (ft) 毫米（英尺）	lengths 支	feet 英尺	m 米
1/4	6.35	0.035	0.89	4,000 / 6,000 / 6096 (20')	1,000	20,000	3,658
1/4	6.35	0.039	1.00	4,000 / 6,000 / 6096 (20')	1,000	20,000	3,658
3/8	9.53	0.035	0.89	4,000 / 6,000 / 6096 (20')	600	12,000	3,658
3/8	9.53	0.039	1.00	4,000 / 6,000 / 6096 (20')	600	12,000	3,658
1/2	12.70	0.039	1.00	4,000 / 6,000 / 6096 (20')	400	10,000	3,048
1/2	12.70	0.049	1.24	4,000 / 6,000 / 6096 (20')	400	10,000	3,048
3/4	19.05	0.065	1.65	4,000 / 6,000 / 6096 (20')	300	6,000	1,829
1	25.4	0.065	1.65	4,000 / 6,000 / 6096 (20')	243	4,860	1,481
1.5	38.10	0.065	1.65	4,000 / 6,000 / 6096 (20')	102	2,040	622
2	50.80	0.065	1.65	4,000 / 6,000 / 6096 (20')	59	1,180	360
2.5	63.50	0.065	1.65	4,000 / 6,000 / 6096 (20')	35	700	213
3	76.20	0.065	1.65	4,000 / 6,000 / 6096 (20')	24	480	146
4	101.60	0.083	2.11	4,000 / 6,000 / 6096 (20')	12	240	73
6	152.40	0.109	2.77	4,000 / 6,000 / 6096 (20')	5	100	30

Line-marking Instruction (直线喷码说明)

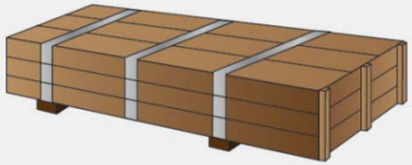
WSG Brand 品牌	Product Code 产品代码	Finish Code 表面代码	Specifications ASTM/JIS 规范美标/日标	Material Grade 材料材质	Dimension ODxWTxLength 尺寸外径x厚度x长度	Product Type 产品类型	NDE ECT 无损检测涡流探测	Heat # 炉号	Manufacturer Origin 制造商原产地
CREST	HPS	AP	A213/A269	316L	1/4"x0.035"x20'	SMLS	NDE	SC88888	WSG, Korea
CREST	HPS	BA	EN 10216-5	1.4435	12.70x1.65x6096	SMLS	NDE	SC88888	WSG, Korea
CREST	HPW	MP	A269/A270-S2	316L	2"x0.065"x20'	WLD	NDE	SC88888	WSG, Korea
CREST	HPW	EP	G3459	SUS316L	63.50x1.65x6096	WLD	NDE	SC88888	WSG, Korea



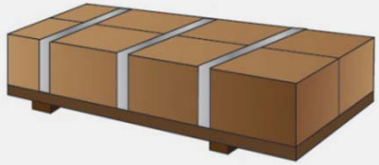
Standard Packaging & Packing (标准包装 和 包装方式)

Poly-Vinyl Single Sleeve >>
(聚乙烯套管)

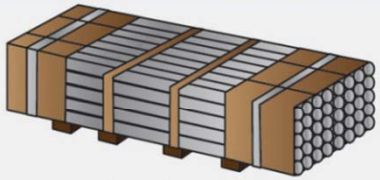




Wooden Box 木箱



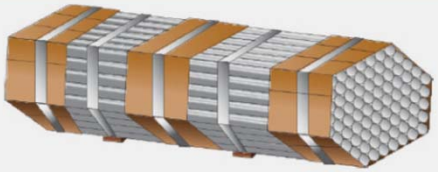
Tri-walled Corrugated Carton 三层瓦楞纸箱



Rectangular Sandwich 矩形三明治捆包



Hexagonal 六角捆装



Hexagonal Sandwich 六角三明治捆包



Steel Crates 铁架包装



精密设计

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