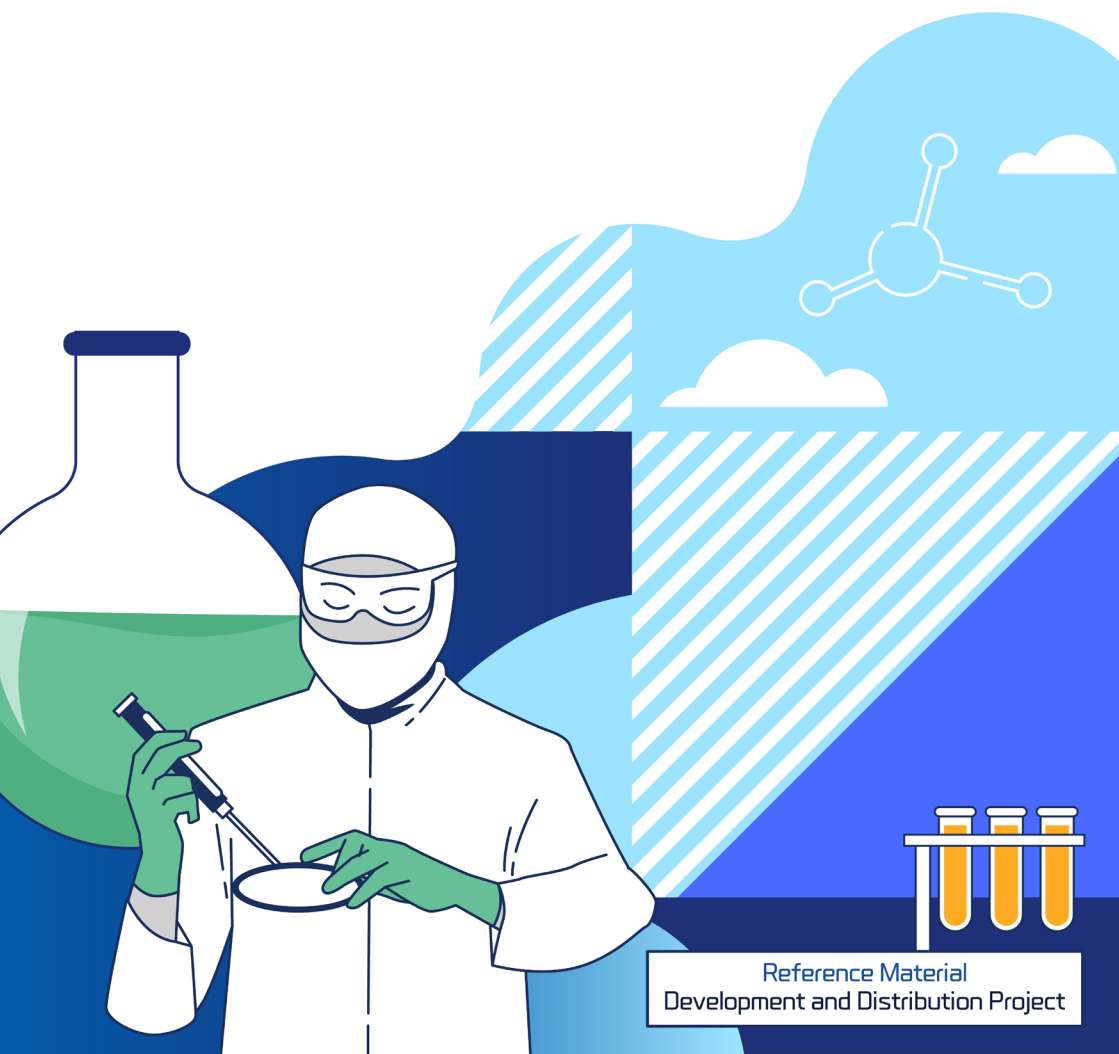


Guide to Reference Material 2023



Reference Material
Development and Distribution Project

I. Division of Chemistry / Biology

〈Reference Material Developed from 2022 to 2023〉





1 Polyvinyl chloride heat transfer coating material for the analysis of phthalates

Category 113. Polymers

Producer KOTITI Testing & Research Institute

Options Batch order **CRM/RM** CRM

Unit of issue 10 g / pack

Certified value or range

- ① Diethyl phthalate : 1 342 mg/kg
- ② Di-n-butyl phthalate : 994 mg/kg
- ③ Benzyl butyl phthalate : 1 167 mg/kg
- ④ Bis(2-ethylhexyl) phthalate : 980 mg/kg

Uncertainty

- ① Diethyl phthalate : 75 mg/kg
- ② Di-n-butyl phthalate : 76 mg/kg
- ③ Benzyl butyl phthalate : 68 mg/kg
- ④ Bis(2-ethylhexyl) phthalate : 72 mg/kg

Usage standard ISO 14389 : 2022



2 Polyurethane/Polyvinyl chloride heat transfer coating material for the analysis of phthalates

Category 113. Polymers

Producer KOTITI Testing & Research Institute

Options Batch order **CRM/RM** CRM

Unit of issue 10 g / pack

Certified value or range

- ① Diethyl phthalate : 1 315 mg/kg
- ② Di-n-butyl phthalate : 970 mg/kg
- ③ Benzyl butyl phthalate : 1 085 mg/kg
- ④ Bis(2-ethylhexyl) phthalate : 952 mg/kg

Uncertainty

- ① Diethyl phthalate : 70 mg/kg
- ② Di-n-butyl phthalate : 79 mg/kg
- ③ Benzyl butyl phthalate : 66 mg/kg
- ④ Bis(2-ethylhexyl) phthalate : 43 mg/kg

Usage standard ISO 14389 : 2022



3 Polystyrene reference material for high concentration HBCDD analysis

Category 113. Polymer additives

Producer Korea Testing Laboratory

Options Batch order **CRM/RM** RM

Unit of issue Pellet 20 g / bottle

Certified value or range 109 mg/kg

Uncertainty 11 mg/kg

Usage standard IEC 62321-9: 2021



4 Polystyrene reference material for low concentration HBCDD analysis

Category 113. Polymer additives

Producer Korea Testing Laboratory

Options Batch order **CRM/RM** RM

Unit of issue Pellet 20 g / bottle

Certified value or range 874 mg/kg

Uncertainty 60 mg/kg

Usage standard IEC 62321-9: 2021



5 Dyeing fabric RM for the analysis of allergic dispersed dyes (type 1/4)

Category 113. Polymers

Producer FITI Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue Sheet (5 g / Pack)

Certified value or range (20 ~ 50) mg/kg

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard KS K 0736:2019



7 Dyeing fabric RM for the analysis of allergic dispersed dyes (type 3/4)

Category 113. Polymers

Producer FITI Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue Sheet (5 g / Pack)

Certified value or range (70 ~ 100) mg/kg

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard KS K 0736:2019



6 Dyeing fabric RM for the analysis of allergic dispersed dyes (type 2/4)

Category 113. Polymers

Producer FITI Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue Sheet (5 g / Pack)

Certified value or range (20 ~ 50) mg/kg

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard KS K 0736:2019



8 Dyeing fabric RM for the analysis of allergic dispersed dyes (type 4/4)

Category 113. Polymers

Producer FITI Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue Sheet (5 g / Pack)

Certified value or range (70 ~ 100) mg/kg

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard KS K 0736:2019



9 Dyeing fabric RM for the analysis of aryl amines (type 1/2)

Category 114. Other chemical composition
Producer FITI Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue Sheet (10 g / Pack)

Certified value or range (10 ~ 30) mg/kg

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard KS K 0147:2021



10 Dyeing fabric RM for the analysis of aryl amines (type 2/2)

Category 114. Other chemical composition
Producer FITI Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue Sheet (10 g / Pack)

Certified value or range (30 ~ 100) mg/kg

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard KS K 0147:2021



11 Glucose solution for glucometer (type 1/3)

Category 111. Clinical and Biochemical Materials
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** CRM

Unit of issue Liquid 5 mL / bottle

Certified value or range level 1 : (30 ~ 50) mg/kg

Uncertainty max. 3 % (Confidence level 95 %, $k = 2$)

Usage standard KRISS T-02-184-2021



12 Glucose solution for glucometer (type 2/3)

Category 111. Clinical and Biochemical Materials
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** CRM

Unit of issue Liquid 5 mL / bottle

Certified value or range level 2 : (960 ~ 1440) mg/kg

Uncertainty max. 3 % (Confidence level 95 %, $k = 2$)

Usage standard KRISS T-02-184-2021



13 Glucose solution for glucometer (type 3/3)

Category 111. Clinical and Biochemical Materials
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** CRM

Unit of issue	Liquid 5 mL / bottle
Certified value or range	Level 3 : (2800 ~ 4200) mg/kg
Uncertainty	max. 3 % (Confidence level 95 %, $k = 2$)
Usage standard	KRISS T-02-184-2021



15 Phosphonoacetic acid

Category 104. High purity chemicals
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** CRM

Unit of issue	Powder 500 mg / bottle
Certified value or range	Purity 99 ~ 100 %
Uncertainty	5 %
Usage standard	T-02-081



14 Fumaric acid

Category 104. High purity chemicals
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** CRM

Unit of issue	Powder 500 mg / bottle
Certified value or range	Purity 99 ~ 100 %
Uncertainty	5 %
Usage standard	T-02-081



16 2-Chloro-4-fluorotoluene

Category 104. High purity chemicals
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** CRM

Unit of issue	Liquid 500 μ L / bottle
Certified value or range	Purity 99 ~ 100 %
Uncertainty	5 %
Usage standard	T-02-081



17 Acetanilide

Category 104. High purity chemicals
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** CRM

Unit of issue Powder 500 mg / bottle

Certified value or range Purity 99 ~ 100 %

Uncertainty 5 %

Usage standard T-02-081



18 Ethylene carbonate

Category 104. High purity chemicals
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** CRM

Unit of issue Powder 500 mg / bottle

Certified value or range Purity 99 ~ 100 %

Uncertainty 5 %

Usage standard T-02-081



19 Synthetic leather (Silicone-polyester) for the analysis of Dimethyl fumarate(DMFu) reference material

Category 114. Other chemical composition
Producer KOTITI Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue 10 g / pack

Certified value or range Dimethyl fumarate : 0.110 1 mg/kg

Uncertainty Dimethyl fumarate : 0.008 9 mg/kg

Usage standard ISO 16186 : 2021



20 Cream for the analysis of steroid substances Certified Reference Material

Category 114. Other chemical composition
Producer KOTITI Testing & Research Institute
Options Batch order **CRM/RM** CRM

Unit of issue Cosmetic (cream) 25 g / bottle

Certified value or range Hydrocortisone : 8.92 mg/kg

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard 「Guidelines for Analysis of Incompatible Components in Cosmetics」 : ID-LC-MS/MS



21 3-Microplastics reference material (type 1/9)

Category 113. Polymers
Producer Korea Testing & Research Institute
Options Individual order **CRM/RM** RM

Unit of issue Powder 1 g / bottle

Certified value or range 0.36 %

Uncertainty 0.02 %

Usage standard KTRMP-I-T05-11101-01



22 3-Microplastics reference material (type 2/9)

Category 113. Polymers
Producer Korea Testing & Research Institute
Options Individual order **CRM/RM** RM

Unit of issue Powder 1 g / bottle

Certified value or range 0.59 %

Uncertainty 0.03 %

Usage standard KTRMP-I-T05-11101-01



23 3-Microplastics reference material (type 3/9)

Category 113. Polymers
Producer Korea Testing & Research Institute
Options Individual order **CRM/RM** RM

Unit of issue Powder 1 g / bottle

Certified value or range 0.19 %

Uncertainty 0.01 %

Usage standard KTRMP-I-T05-11101-01



24 3-Microplastics reference material (type 4/9)

Category 113. Polymers
Producer Korea Testing & Research Institute
Options Individual order **CRM/RM** RM

Unit of issue Powder 1 g / bottle

Certified value or range 0.83 %

Uncertainty 0.03 %

Usage standard KTRMP-I-T05-11101-01



25 3-Microplastics reference material (type 5/9)

Category 113. Polymers
Producer Korea Testing & Research Institute
Options Individual order **CRM/RM** RM

Unit of issue	Powder 1 g / bottle
Certified value or range	1.00 %
Uncertainty	0.05 %
Usage standard	KTRMP-I-T05-11101-01



26 3-Microplastics reference material (type 6/9)

Category 113. Polymers
Producer Korea Testing & Research Institute
Options Individual order **CRM/RM** RM

Unit of issue	Powder 1 g / bottle
Certified value or range	0.40 %
Uncertainty	0.02 %
Usage standard	KTRMP-I-T05-11101-01



27 3-Microplastics reference material (type 7/9)

Category 113. Polymers
Producer Korea Testing & Research Institute
Options Individual order **CRM/RM** RM

Unit of issue	Powder 1 g / bottle
Certified value or range	1.23 %
Uncertainty	0.04 %
Usage standard	KTRMP-I-T05-11101-01



28 3-Microplastics reference material (type 8/9)

Category 113. Polymers
Producer Korea Testing & Research Institute
Options Individual order **CRM/RM** RM

Unit of issue	Powder 1 g / bottle
Certified value or range	1.21 %
Uncertainty	0.05 %
Usage standard	KTRMP-I-T05-11101-01



29 3-Microplastics reference material (type 9/9)

Category 113. Polymers
Producer Korea Testing & Research Institute
Options Individual order **CRM/RM** RM

Unit of issue Powder 1 g / bottle

Certified value or range 0.57 %

Uncertainty 0.57 %

Usage standard KTRMP-I-T05-11101-01



30 Carcinoembryonic antigen (CEA)

Category 111. Clinical and biochemical materials
Producer Bore Da Biotech
Options Batch order **CRM/RM** RM

Unit of issue 200 μL / vial

Certified value or range concentration : (80.00 ~ 120.00) $\mu\text{g/mL}$

Uncertainty 2.26 $\mu\text{g/mL}$ (Confidence level about 95 %, $k = 2$)

Usage standard The Korean Pharmacopoeia



31 CEA antibody (3G3)

Category 111. Clinical and biochemical materials
Producer Bore Da Biotech
Options Batch order **CRM/RM** RM

Unit of issue 500 μL / vial

Certified value or range concentration : (80.00 ~ 120.00) $\mu\text{g/mL}$

Uncertainty 0.2 $\mu\text{g/mL}$ (Confidence level about 95 %, $k = 2$)

Usage standard The Korean Pharmacopoeia



32 CEA antibody (D3H3)

Category 111. Clinical and biochemical materials
Producer Bore Da Biotech
Options Batch order **CRM/RM** RM

Unit of issue 500 μL / vial

Certified value or range concentration : (80.00 ~ 120.00) $\mu\text{g/mL}$

Uncertainty 0.7 $\mu\text{g/mL}$ (Confidence level about 95 %, $k = 2$)

Usage standard The Korean Pharmacopoeia



33 Biological Indicator

Category 110. Health and industry hygiene

Producer Huons Meditech Co.,Ltd

Options Batch order **CRM/RM** RM

Unit of issue	plastic tube / Box
Certified value or range	2.58 min
Uncertainty	0.3542 min
Usage standard	ISO 11138-1 Annex D, D value determination by fraction negative method



34 The aerobic compost for evaluating biodegradability and biodegradability

Category 114. Other chemical composition

Producer FITI Testing and Research Institute

Options Individual order **CRM/RM** RM

Unit of issue	solid / 1 kg
Certified value or range	① 40 kg production : (672.2 ~ 740.2) g/kg ② 200 kg production : (665.0 ~ 749.0) g/kg
Uncertainty	① 40 kg production : 39.9 g/kg ② 200 kg production : 44.5 g/kg
Usage standard	KS T ISO 20200:2004



35 Beef powder for the analysis of quinolone antibiotics

Category 108. Food & agricultures

Producer Korea research institute of standards and science

Options Batch order **CRM/RM** CRM

Unit of issue	Powder 10 g / bottle
Certified value or range	① Ciprofloxacin : (99.86 ± 6.41) µg/kg ② Danofloxacin : (101.94 ± 9.98) µg/kg ③ Sarafloxacin : (89.53 ± 8.25) µg/kg ④ Ofloxacin : (112.29 ± 7.80) µg/kg ⑤ Enrofloxacin : (94.18 ± 5.07) µg/kg ⑥ Norfloxacin : (89.60 ± 10.18) µg/kg ⑦ Flumequine : (99.97 ± 8.07) µg/kg ⑧ Nalidixic acid : (112.03 ± 5.86) µg/kg ⑨ Difloxacin : (142.81 ± 6.74) µg/kg ⑩ Marbofloxacin : (102.97 ± 8.69) µg/kg ⑪ Pefloxacin : (85.32 ± 4.36) µg/kg ⑫ Orbifloxacin : (107.12 ± 3.71) µg/kg

Uncertainty	(Confidence level about 95 %)
	① Ciprofloxacin : 6.42 % ($k = 2.20$)
	② Danofloxacin : 9.79 % ($k = 2.16$)
	③ Sarafloxacin : 9.21 % ($k = 2.18$)
	④ Ofloxacin : 6.95 % ($k = 2.20$)
	⑤ Enrofloxacin : 5.38 % ($k = 2.10$)
	⑥ Norfloxacin : 11.36 % ($k = 2.20$)
	⑦ Flumequine : 8.08 % ($k = 2.57$)
	⑧ Nalidixic acid : 5.23 % ($k = 2.45$)
	⑨ Difloxacin : 4.72 % ($k = 2.14$)
	⑩ Marbofloxacin : 8.44 % ($k = 2.14$)
	⑪ Pefloxacin : 5.11 % ($k = 2.14$)
	⑫ Orbifloxacin : 3.46 % ($k = 2.20$)

Usage standard KS A ISO Guide 35:2017



36 Polyethylene reference material for implantation test in muscle

Category 114. Other chemical compositions

Producer Kemidas, Co. Ltd.

Options Batch order **CRM/RM** RM

Unit of issue	Rod (2 mm(Dia.) x 100 mm)
Certified value or range	< 2.9 (minimal or no reaction) & < 4 % (grade 0, None)
Uncertainty	NA
Usage standard	ISO 10993-6 (2016) Annex A (normative), Annex B (normative) & ISO 10993-5 (2009) 8.2 Test on extracts



38 Polyethylene reference material for implantation test in subcutaneous tissue

Category 114. Other chemical compositions

Producer Kemidas, Co. Ltd.

Options Batch order **CRM/RM** RM

Unit of issue	Sheet (30 mm x 100 mm x 0.5 mm (Thickness))
Certified value or range	< 2.9 (minimal or no reaction) & < 4 % (grade 0, None)
Uncertainty	NA
Usage standard	ISO 10993-6 (2016) Annex A (normative), Annex B (normative) & ISO 10993-5 (2009) 8.2 Test on extracts



37 ZDEC-SPU reference material for implantation test in muscle

Category 114. Other chemical compositions

Producer Kemidas, Co. Ltd.

Options Batch order **CRM/RM** RM

Unit of issue	Rod (2 mm (Dia.) x 50 mm)
Certified value or range	> 9.0 (moderate reaction) & > 70% (grade 4, Severe)
Uncertainty	NA
Usage standard	ISO 10993-6 (2016) Annex A (normative), Annex B (normative) & ISO 10993-5 (2009) 8.2 Test on extracts



39 ZDEC-SPU reference material for implantation test in subcutaneous tissue

Category 114. Other chemical compositions

Producer Kemidas, Co. Ltd.

Options Batch order **CRM/RM** RM

Unit of issue	Sheet (100 mm x 150 mm x 0.5 mm(Thickness))
Certified value or range	> 9.0 (moderate reaction) & > 70 % (grade 4, Severe)
Uncertainty	NA
Usage standard	ISO 10993-6 (2016) Annex A (normative), Annex B (normative) & ISO 10993-5 (2009) 8.2 Test on extracts

II. Division of Electricity / Electron / Ceramic

〈Reference Material Developed from 2022 to 2023〉





40 10 nm TiN Thin Film

Category 207. Metrology

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order CRM/RM CRM

Unit of issue Thin Film (10 mm X 10 mm X 0.6 mm) / ea

Certified value
or range 10.02 nm

Uncertainty 0.51 nm

Usage standard ISO 20263:2017



41 10 nm TaN Thin Film

Category 207. Metrology

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order CRM/RM CRM

Unit of issue Thin Film (10 mm X 10 mm X 0.6 mm) / ea

Certified value
or range 9.95 nm

Uncertainty 0.49 nm

Usage standard ISO 20263:2017



42 Liquid CRM for conductivity (type 1/6)

Category 201. Ion activity

Producer Korea Testing Laboratory

Options Batch order CRM/RM CRM

Unit of issue Liquid 500 ml / bottle

Certified value
or range 1 μ S/cmUncertainty 0.99 μ S/cm

Usage standard KS I 8001:2009



43 Liquid CRM for conductivity (type 2/6)

Category 201. Ion activity

Producer Korea Testing Laboratory

Options Batch order CRM/RM CRM

Unit of issue Liquid 500 ml / bottle

Certified value
or range 5 μ S/cmUncertainty 0.99 μ S/cm

Usage standard KS I 8001:2009



44 Liquid CRM for conductivity (type 3/6)

Category 201. Ion activity
 Producer Korea Testing Laboratory
 Options Batch order CRM/RM CRM

Unit of issue Liquid 500 ml / bottle

Certified value or range 10 $\mu\text{S}/\text{cm}$

Uncertainty 0.99 $\mu\text{S}/\text{cm}$

Usage standard KS I 8001:2009



46 Liquid CRM for conductivity (type 5/6)

Category 201. Ion activity
 Producer Korea Testing Laboratory
 Options Batch order CRM/RM CRM

Unit of issue Liquid 500 ml / bottle

Certified value or range 1413 $\mu\text{S}/\text{cm}$

Uncertainty 8 $\mu\text{S}/\text{cm}$

Usage standard KS I 8001:2009



45 Liquid CRM for conductivity (type 4/6)

Category 201. Ion activity
 Producer Korea Testing Laboratory
 Options Batch order CRM/RM CRM

Unit of issue Liquid 500 ml / bottle

Certified value or range 100 $\mu\text{S}/\text{cm}$

Uncertainty 4 $\mu\text{S}/\text{cm}$

Usage standard KS I 8001:2009



47 Liquid CRM for conductivity (type 6/6)

Category 201. Ion activity
 Producer Korea Testing Laboratory
 Options Batch order CRM/RM CRM

Unit of issue Liquid 500 ml / bottle

Certified value or range 10000 $\mu\text{S}/\text{cm}$

Uncertainty 80 $\mu\text{S}/\text{cm}$

Usage standard KS I 8001:2009



48 Reference Material for Refractoriness (type 1/12)

Category 203. Other

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order CRM/RM CRM

Unit of issue Cone / Box

Certified value or range 1535

Uncertainty $\pm 11\%$

Usage standard KS L ISO 1146:1988, KS L 3113:2016



49 Reference Material for Refractoriness (type 2/12)

Category 203. Other

Producer Korea Institute of Ceramic Engineering and Technology

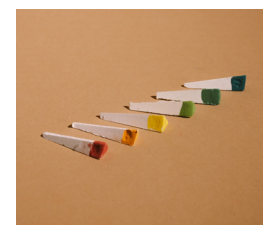
Options Batch order CRM/RM CRM

Unit of issue Cone / Box

Certified value or range 1558

Uncertainty $\pm 11\%$

Usage standard KS L ISO 1146:1988, KS L 3113:2016



50 Reference Material for Refractoriness (type 3/12)

Category 203. Other

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order CRM/RM CRM

Unit of issue Cone / Box

Certified value or range 1575

Uncertainty $\pm 11\%$

Usage standard KS L ISO 1146:1988, KS L 3113:2016



51 Reference Material for Refractoriness (type 4/12)

Category 203. Other

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order CRM/RM CRM

Unit of issue Cone / Box

Certified value or range 1579

Uncertainty $\pm 10\%$

Usage standard KS L ISO 1146:1988, KS L 3113:2016



52 Reference Material for Refractoriness (type 5/12)

Category 203. Other

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order CRM/RM RM

Unit of issue Cone / Box

Certified value
or range 1631

Uncertainty $\pm 13 \%$

Usage standard KS L ISO 1146:1988, KS L 3113:2016



54 Reference Material for Refractoriness (type 7/12)

Category 203. Other

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order CRM/RM RM

Unit of issue Cone / Box

Certified value
or range 1637

Uncertainty $\pm 13 \%$

Usage standard KS L ISO 1146:1988, KS L 3113:2016



53 Reference Material for Refractoriness (type 6/12)

Category 203. Other

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order CRM/RM RM

Unit of issue Cone / Box

Certified value
or range 1635

Uncertainty $\pm 11 \%$

Usage standard KS L ISO 1146:1988, KS L 3113:2016



55 Reference Material for Refractoriness (type 8/12)

Category 203. Other

Producer Korea Institute of Ceramic Engineering and Technology

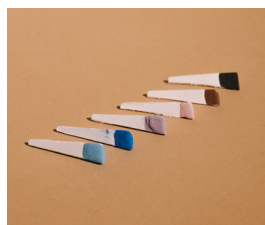
Options Batch order CRM/RM RM

Unit of issue Cone / Box

Certified value
or range 1639

Uncertainty $\pm 10 \%$

Usage standard KS L ISO 1146:1988, KS L 3113:2016



56 Reference Material for Refractoriness (type 9/12)

Category 203. Other
 Producer Korea Institute of Ceramic Engineering and Technology
 Options Batch order CRM/RM RM

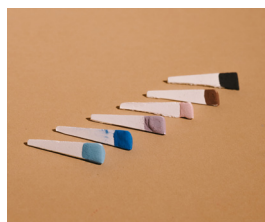
Unit of issue	Cone / Box
Certified value or range	1677
Uncertainty	± 13 %
Usage standard	KS L ISO 1146:1988, KS L 3113:2016



58 Reference Material for Refractoriness (type 11/12)

Category 203. Other
 Producer Korea Institute of Ceramic Engineering and Technology
 Options Batch order CRM/RM RM

Unit of issue	Cone / Box
Certified value or range	1694
Uncertainty	± 13 %
Usage standard	KS L ISO 1146:1988, KS L 3113:2016



57 Reference Material for Refractoriness (type 10/12)

Category 203. Other
 Producer Korea Institute of Ceramic Engineering and Technology
 Options Batch order CRM/RM RM

Unit of issue	Cone / Box
Certified value or range	1679
Uncertainty	± 12 %
Usage standard	KS L ISO 1146:1988, KS L 3113:2016



59 Reference Material for Refractoriness (type 12/12)

Category 203. Other
 Producer Korea Institute of Ceramic Engineering and Technology
 Options Batch order CRM/RM RM

Unit of issue	Cone / Box
Certified value or range	1706
Uncertainty	± 14 %
Usage standard	KS L ISO 1146:1988, KS L 3113:2016

60 50 nm Ge₂Sb₂Te₅ Thin Film

Category 207. Metrology

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order CRM/RM CRM

Unit of issue Thin Film (10 mm X 10 mm X 0.6 mm) / ea

Certified value or range 49.27 nm

Uncertainty 1.57 nm

Usage standard ISO 20263:2017

61 100 nm Ge₂Sb₂Te₅ Thin Film

Category 207. Metrology

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order CRM/RM CRM

Unit of issue Thin Film (10 mm X 10 mm X 0.6 mm) / ea

Certified value or range 98.82 nm

Uncertainty 1.57 nm

Usage standard 2.97 nm



62 Reference materials for particle size and shape analysis (50 μm grade)

Category 301. Particle size

Producer Korea Testing Laboratory

Options Batch order CRM/RM RM

Unit of issue Solid 10 g / bottle

Certified value or range

- ① particle size : 53.3 μm
- ② aspect ratio : 0.956
- ③ circularity : 0.994

Uncertainty

- ① particle size : 1.7 μm
- ② aspect ratio : 0.011
- ③ circularity : 0.011

Usage standard ISO 9276-6:2008



63 Reference materials for particle size and shape analysis (100 μm grade)

Category 301. Particle size

Producer Korea Testing Laboratory

Options Batch order CRM/RM RM

Unit of issue Solid 10 g / bottle

Certified value or range

- ① particle size : 103.7 μm
- ② aspect ratio : 0.960
- ③ circularity : 0.997

Uncertainty

- ① particle size : 3.0 μm
- ② aspect ratio : 0.015
- ③ circularity : 0.011

Usage standard ISO 9276-6:2008



64 Aluminium oxide for chemical analysis (type 1/2)

Category 106. Inorganics, rocks, ores
Producer Korea Institute of Ceramic Engineering and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	Powder 40 g / bottle
Certified value or range	① Fe : 50 ~ 300 mg/kg ② Si : 50 ~ 300 mg/kg ③ Ca : 50 ~ 300 mg/kg ④ Na : 500 ~ 1 500 mg/kg ⑤ Ti : 10 ~ 50 mg/kg
Uncertainty	10 % (Confidence level 95 %, $k = 2$)

Usage standard KICET-QI-10606-117:2002



65 Aluminium oxide for chemical analysis (type 2/2)

Category 106. Inorganics, rocks, ores
Producer Korea Institute of Ceramic Engineering and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	Powder 40 g / bottle
Certified value or range	① Fe : 50 ~ 300 mg/kg ② Mg : 100 ~ 800 mg/kg ③ Si : 50 ~ 300 mg/kg ④ Ca : 50 ~ 300 mg/kg ⑤ Na : 100 ~ 500 mg/kg ⑥ Ti : 10 ~ 50 mg/kg
Uncertainty	10 % (Confidence level 95 %, $k = 2$)
Usage standard	KICET-QI-10606-117:2002



66 Reference materials of SWCNT dispersions as conductive additive (0.4 wt %)

Category 301. Sizing
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** RM

Unit of issue	Liquid 20 g / bottle
Certified value or range	250 ~ 350 cP
Uncertainty	10 % (Confidence level 95 %, $k = 2$)
Usage standard	ASTM D2196-15



67 Reference materials of SWCNT dispersions as conductive additive (0.8 wt %)

Category 301. Sizing
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** RM

Unit of issue	Liquid 20 g / bottle
Certified value or range	1300 ~ 1600 cP
Uncertainty	10 % (Confidence level 95 %, $k = 2$)
Usage standard	ASTM D2196-15



68 Reference materials of SWCNT dispersions as conductive additive (1.0 wt %)

Category 301. Sizing

Producer Korea Testing Laboratory

Options Batch order

CRM/RM RM

Unit of issue Liquid 20 g / bottle

Certified value or range 2000 ~ 2500 cP

Uncertainty 10 % (Confidence level 95 %, $k = 2$)

Usage standard ASTM D2196-15



70 Reference materials of SWCNT dispersions as conductive additive (0.8 wt %)

Category 301. Sizing

Producer Korea Testing Laboratory

Options Batch order

CRM/RM RM

Unit of issue Liquid 20 g / bottle

Certified value or range 1.90 ~ 2.20 wt%

Uncertainty 10 % (Confidence level 95 %, $k = 2$)

Usage standard KS M ISO 3251



69 Reference materials of SWCNT dispersions as conductive additive (0.4 wt %)

Category 301. Sizing

Producer Korea Testing Laboratory

Options Batch order

CRM/RM RM

Unit of issue Liquid 20 g / bottle

Certified value or range 0.09 ~ 1.20 wt %

Uncertainty 10 % (Confidence level 95 %, $k = 2$)

Usage standard KS M ISO 3251



71 Reference materials of SWCNT dispersions as conductive additive (1.0 wt %)

Category 301. Sizing

Producer Korea Testing Laboratory

Options Batch order

CRM/RM RM

Unit of issue Liquid 20 g / bottle

Certified value or range 2.40 ~ 2.70 wt%

Uncertainty 10 % (Confidence level 95 %, $k = 2$)

Usage standard KS M ISO 3251



72 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 1/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 10 nm, Diameter of wafer : 100 mm

Certified value or range 11.78 nm

Uncertainty 0.84 nm

Usage standard KRISS R-207-018



73 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 2/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 20 nm, Diameter of wafer : 100 mm

Certified value or range 20.65 nm

Uncertainty 0.82 nm

Usage standard KRISS R-207-018



74 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 3/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 40 nm, Diameter of wafer : 100 mm

Certified value or range 39.82 nm

Uncertainty 0.39 nm

Usage standard KRISS R-207-018



75 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 4/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 90 nm, Diameter of wafer : 100 mm

Certified value or range 87.76 nm

Uncertainty 1.6 nm

Usage standard KRISS R-207-018



76 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 5/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

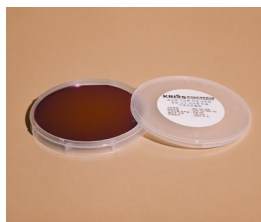
Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 120 nm, Diameter of wafer : 100 mm

Certified value or range 118.1 nm

Uncertainty 1.4 nm

Usage standard KRISS R-207-018



77 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 6/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

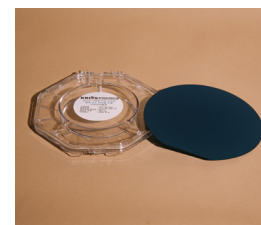
Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 200 nm, Diameter of wafer : 100 mm

Certified value or range 193.8 nm

Uncertainty 2.6 nm

Usage standard KRISS R-207-018



78 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 7/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

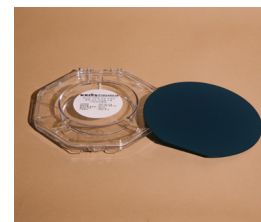
Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 10 nm, Diameter of wafer : 150 mm

Certified value or range 11.73 nm

Uncertainty 0.84 nm

Usage standard KRISS R-207-018



79 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 8/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

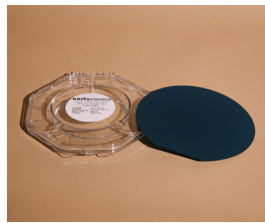
Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 20 nm, Diameter of wafer : 150 mm

Certified value or range 20.88 nm

Uncertainty 0.82 nm

Usage standard KRISS R-207-018



80 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 9/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

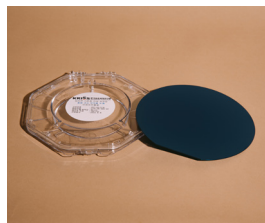
Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 40 nm, Diameter of wafer : 150 mm

Certified value or range 39.16 nm

Uncertainty 0.39 nm

Usage standard KRISS R-207-018



81 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 10/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

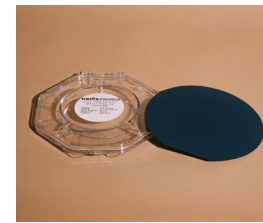
Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 90 nm, Diameter of wafer : 150 mm

Certified value or range 87.7 nm

Uncertainty 1.6 nm

Usage standard KRISS R-207-018



82 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 11/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

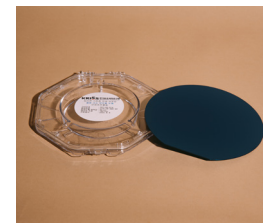
Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 120 nm, Diameter of wafer : 150 mm

Certified value or range 118.6 nm

Uncertainty 1.4 nm

Usage standard KRISS R-207-018



83 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 12/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

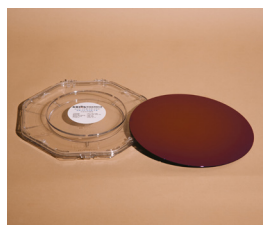
Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 200 nm, Diameter of wafer : 150 mm

Certified value or range 194.1 nm

Uncertainty 2.6 nm

Usage standard KRISS R-207-018



84 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 13/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

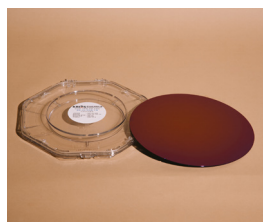
Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 10 nm, Diameter of wafer : 200 mm

Certified value or range 11.34 nm

Uncertainty 0.84 nm

Usage standard KRISS R-207-018



85 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 14/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

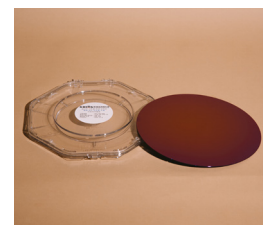
Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 20 nm, Diameter of wafer : 200 mm

Certified value or range 20.62 nm

Uncertainty 0.82 nm

Usage standard KRISS R-207-018



86 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 15/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

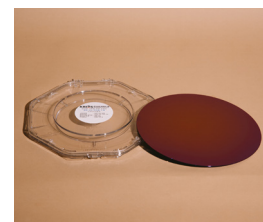
Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 40 nm, Diameter of wafer : 200 mm

Certified value or range 39.87 nm

Uncertainty 0.39 nm

Usage standard KRISS R-207-018



87 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 16/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

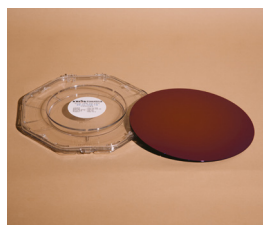
Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 90 nm, Diameter of wafer : 200 mm

Certified value or range 87.9 nm

Uncertainty 1.6 nm

Usage standard KRISS R-207-018



88 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 17/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

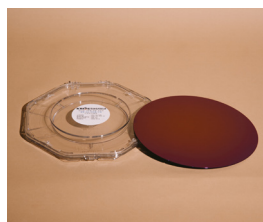
Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 120 nm, Diameter of wafer : 200 mm

Certified value or range 118.2 nm

Uncertainty 1.4 nm

Usage standard KRISS R-207-018



89 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 18/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 200 nm, Diameter of wafer : 200 mm

Certified value or range 193.5 nm

Uncertainty 2.6 nm

Usage standard KRISS R-207-018



90 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 19/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 10 nm, Diameter of wafer : 300 mm

Certified value or range 10.03 nm

Uncertainty 0.84 nm

Usage standard KRISS R-207-018



91 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 20/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual type (on demand) **CRM/RM** CRM

Unit of issue Nominal thickness of silicon nitride film layer : 20 nm, Diameter of wafer : 300 mm

Certified value or range 20.77 nm

Uncertainty 0.82 nm

Usage standard KRISS R-207-018



92 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 21/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual type (on demand) CRM/RM CRM

Unit of issue Nominal thickness of silicon nitride film layer : 40 nm, Diameter of wafer : 300 mm

Certified value or range 40.83 nm

Uncertainty 0.39 nm

Usage standard KRISS R-207-018



93 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 22/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual type (on demand) CRM/RM CRM

Unit of issue Nominal thickness of silicon nitride film layer : 90 nm, Diameter of wafer : 300 mm

Certified value or range 90.1 nm

Uncertainty 1.6 nm

Usage standard KRISS R-207-018



94 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 23/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual type (on demand) CRM/RM CRM

Unit of issue Nominal thickness of silicon nitride film layer : 120 nm, Diameter of wafer : 300 mm

Certified value or range 122.0 nm

Uncertainty 1.4 nm

Usage standard KRISS R-207-018



95 Certified reference material for the thickness of a thin film layer of silicon nitride grown on silicon (type 24/24)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual type (on demand) CRM/RM CRM

Unit of issue Nominal thickness of silicon nitride film layer : 200 nm, Diameter of wafer : 300 mm

Certified value or range 203.2 nm

Uncertainty 2.6 nm

Usage standard KRISS R-207-018



96 Zirconia slurry for chemical analysis and solid contents test (type 1/2)

Category 106. Chemical analysis
Producer Korea Institute of Ceramic Engineering and Technology
Options Batch order **CRM/RM** RM

Unit of issue	Liquid 30 ml / bottle
Certified value or range	① Solid Content : 60.2 % ② ZrO ₂ : 92.98 % ③ Y ₂ O ₃ : 5.859 %
Uncertainty	① 0.7 % ② 2.6 % ③ 0.1 %
Usage standard	KICET-QI-10606-0072022, ISO 23739:2021, ISO 23739:2021



97 Zirconia slurry for chemical analysis and solid contents test (type 2/2)

Category 106. Chemical analysis
Producer Korea Institute of Ceramic Engineering and Technology
Options Batch order **CRM/RM** RM

Unit of issue	Liquid 30 ml / bottle
Certified value or range	① Solid Content : 80.4 % ② ZrO ₂ : 94.00 % ③ Y ₂ O ₃ : 5.804 %
Uncertainty	① 0.7 % ② 2.29 % ③ 0.1 %
Usage standard	KICET-QI-10606-0072022, ISO 23739:2021, ISO 23739:2021



98 Sheet Resistance of Semiconductor (type 1/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue	206-01-0.02
Certified value or range	21.06 mΩ/□
Uncertainty	0.7 %
Usage standard	ASTM F84



99 Sheet Resistance of Semiconductor (type 2/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue	206-01-0.05
Certified value or range	50.30 mΩ/□
Uncertainty	0.7 %
Usage standard	ASTM F84



100 Sheet Resistance of Semiconductor (type 3/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue 206-01-0.3

Certified value or range 302.0 mΩ/□

Uncertainty 0.7 %

Usage standard ASTM F84



102 Sheet Resistance of Semiconductor (type 5/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue 206-01-50

Certified value or range 50.66 Ω/□

Uncertainty 0.7 %

Usage standard ASTM F84



101 Sheet Resistance of Semiconductor (type 4/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue 206-01-10

Certified value or range 9.34 Ω/□

Uncertainty 0.7 %

Usage standard ASTM F84



103 Sheet Resistance of Semiconductor (type 6/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue 206-01-100

Certified value or range 100.5 Ω/□

Uncertainty 0.7 %

Usage standard ASTM F84



104 Sheet Resistance of Semiconductor (type 7/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue 206-01-350

Certified value or range 350.1 $\Omega/\square$

Uncertainty 0.7 %

Usage standard ASTM F84



106 Sheet Resistance of Semiconductor (type 9/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue 206-01-3k

Certified value or range 3.012 $k\Omega/\square$

Uncertainty 0.7 %

Usage standard ASTM F84



105 Sheet Resistance of Semiconductor (type 8/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue 206-01-1k

Certified value or range 1.016 $k\Omega/\square$

Uncertainty 0.7 %

Usage standard ASTM F84



107 Sheet Resistance of Semiconductor (type 10/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue 206-01-10k

Certified value or range 9.08 $k\Omega/\square$

Uncertainty 0.7 %

Usage standard ASTM F84



108 Sheet Resistance of ITO (type 1/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue 206-ITO-5

Certified value or range 7.130 $\Omega/\square$

Uncertainty 0.5 %

Usage standard ASTM F84



110 Sheet Resistance of ITO (type 3/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue 206-ITO-20

Certified value or range 20.97 $\Omega/\square$

Uncertainty 0.5 %

Usage standard ASTM F84



109 Sheet Resistance of ITO (type 2/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue 206-ITO-10

Certified value or range 11.81 $\Omega/\square$

Uncertainty 0.5 %

Usage standard ASTM F84



111 Sheet Resistance of ITO (type 4/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue 206-ITO-35

Certified value or range 35.15 $\Omega/\square$

Uncertainty 0.5 %

Usage standard ASTM F84



112 Sheet Resistance of ITO (type 5/10)

Category 206. Electricity and magnetic properties

Producer Korea Research Institute of Standards and Science

Options Individual Order **CRM/RM** CRM

Unit of issue 206-ITO-50

Certified value or range 43.29 $\Omega/\square$

Uncertainty 0.5 %

Usage standard ASTM F84



114 Sheet Resistance of ITO (type 7/10)

Category 206. Electricity and magnetic properties

Producer Korea Research Institute of Standards and Science

Options Individual Order **CRM/RM** CRM

Unit of issue 206-ITO-150

Certified value or range 150.4 $\Omega/\square$

Uncertainty 0.5 %

Usage standard ASTM F84



113 Sheet Resistance of ITO (type 6/10)

Category 206. Electricity and magnetic properties

Producer Korea Research Institute of Standards and Science

Options Individual Order **CRM/RM** CRM

Unit of issue 206-ITO-70

Certified value or range 71.47 $\Omega/\square$

Uncertainty 0.5 %

Usage standard ASTM F84



115 Sheet Resistance of ITO (type 8/10)

Category 206. Electricity and magnetic properties

Producer Korea Research Institute of Standards and Science

Options Individual Order **CRM/RM** CRM

Unit of issue 206-ITO-200

Certified value or range 201.2 $\Omega/\square$

Uncertainty 0.5 %

Usage standard ASTM F84



116 Sheet Resistance of ITO (type 9/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue	206-ITO-300
Certified value or range	288.5 $\Omega/\square$
Uncertainty	0.5 %
Usage standard	ASTM F84



117 Sheet Resistance of ITO (type 10/10)

Category 206. Electricity and magnetic properties
Producer Korea Research Institute of Standards and Science
Options Individual Order **CRM/RM** CRM

Unit of issue	206-ITO-500
Certified value or range	491.8 $\Omega/\square$
Uncertainty	0.5 %
Usage standard	ASTM F84



118 Colloidal Silica Reference Materials for Ultra Pure Water (type 1/2)

Category 301. Particle characteristics
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** RM

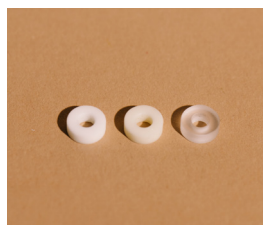
Unit of issue	Liquid 2 ml / syringe
Certified value or range	101 nm
Uncertainty	1.15 nm
Usage standard	ISO 22412



119 Colloidal Silica Reference Materials for Ultra Pure Water (type 2/2)

Category 301. Particle characteristics
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** RM

Unit of issue	Liquid 2 ml / syringe
Certified value or range	498 nm
Uncertainty	4.26 nm
Usage standard	ISO 22412



120 Ceramic/plastic certified reference material for Permittivity measurement (type 1/6)

Category 206. Electrical and magnetic properties

Producer Korea Testing Laboratory

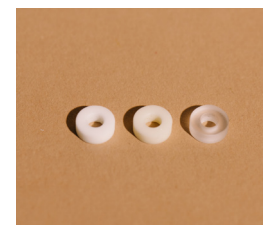
Options In Stock **CRM/RM** CRM

Unit of issue O.D. 7 mm, I.D. 3.04 mm, Thickness 3 mm

Certified value or range Dielectric Constant : (500 MHz ~ 10 GHz) 2 ~ 5

Uncertainty Dielectric Constant : 0.3

Usage standard ASTM D7449/D7449M-22



122 Ceramic/plastic certified reference material for Permittivity measurement (type 3/6)

Category 206. Electrical and magnetic properties

Producer Korea Testing Laboratory

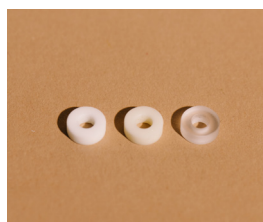
Options In Stock **CRM/RM** CRM

Unit of issue O.D. 7 mm, I.D. 3.04 mm, Thickness 3 mm

Certified value or range Dielectric Constant : (500 MHz ~ 10 GHz) 7 ~ 11

Uncertainty Dielectric Constant : 0.5

Usage standard ASTM D7449/D7449M-22



121 Ceramic/plastic certified reference material for Permittivity measurement (type 2/6)

Category 206. Electrical and magnetic properties

Producer Korea Testing Laboratory

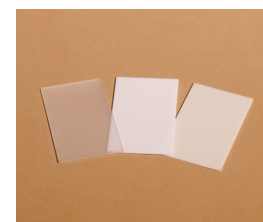
Options In Stock **CRM/RM** CRM

Unit of issue O.D. 7 mm, I.D. 3.04 mm, Thickness 3 mm

Certified value or range Dielectric Constant : (500 MHz ~ 10 GHz) 5 ~ 7

Uncertainty Dielectric Constant : 0.3

Usage standard ASTM D7449/D7449M-22



123 Ceramic/plastic certified reference material for Permittivity measurement (type 4/6)

Category 206. Electrical and magnetic properties

Producer Korea Testing Laboratory

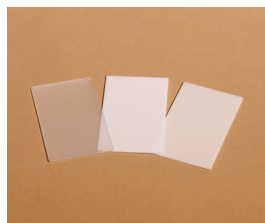
Options In Stock **CRM/RM** CRM

Unit of issue 30 x 50 x 0.8 T (mm)

Certified value or range ① Dielectric Constant : (10 GHz) 2 ~ 5
② Loss Tangent : (10 GHz) 0.000 001 ~ 0.01

Uncertainty ① Dielectric Constant : 0.05
② Loss Tangent : 1.3×10^{-4}

Usage standard IEC 61189-2-721:2015



124 Ceramic/plastic certified reference material for Permittivity measurement (type 5/6)

Category 206. Electrical and magnetic properties

Producer Korea Testing Laboratory

Options In Stock **CRM/RM** CRM

Unit of issue 30 x 50 x 0.8 T (mm)

Certified value or range
① Dielectric Constant : (10 GHz) 5 ~ 7
② Loss Tangent : (10 GHz) 0.000 001 ~ 0.01

Uncertainty
① Dielectric Constant : 0.06
② Loss Tangent : 1.3×10^{-4}

Usage standard IEC 61189-2-721:2015



125 Ceramic/plastic certified reference material for Permittivity measurement (type 6/6)

Category 206. Electrical and magnetic properties

Producer Korea Testing Laboratory

Options In Stock **CRM/RM** CRM

Unit of issue 30 x 50 x 0.8 T (mm)

Certified value or range
① Dielectric Constant : (10 GHz) 7 ~ 11
② Loss Tangent : (10 GHz) 0.000 001 ~ 0.01

Uncertainty
① Dielectric Constant : 0.08
② Loss Tangent : 1.3×10^{-4}

Usage standard IEC 61189-2-721:2015



126 Certified dielectric reference liquid for Permittivity measurement (type 1/4)

Category 206. Electrical and magnetic properties

Producer Korea Testing Laboratory

Options In Stock **CRM/RM** CRM

Unit of issue 250 ml / Bottle

Certified value or range
① Dielectric Constant : (200 MHz ~ 1.4 GHz) 2 ~ 3
② Dielectric Loss : (200 MHz ~ 1.4 GHz) 0.000 1 ~ 0.01

Uncertainty
① Dielectric Constant : 0.2
② Dielectric Loss : 0.1

Usage standard ASTM D7449/D7449M-22
IEC/IEEE 62209-1528 : 2020



127 Certified dielectric reference liquid for Permittivity measurement (type 2/4)

Category 206. Electrical and magnetic properties

Producer Korea Testing Laboratory

Options In Stock **CRM/RM** CRM

Unit of issue 250 ml / Bottle

Certified value or range
① Dielectric Constant : (200 MHz ~ 1.4 GHz) 3 ~ 30
② Dielectric Loss : (200 MHz ~ 1.4 GHz) 0.000 1 ~ 15

Uncertainty
① Dielectric Constant : 0.5
② Dielectric Loss : 0.4

Usage standard ASTM D7449/D7449M-22
IEC/IEEE 62209-1528 : 2020



128 Certified dielectric reference liquid for Permittivity measurement (type 3/4)

Category 206. Electrical and magnetic properties

Producer Korea Testing Laboratory

Options In Stock **CRM/RM** CRM

Unit of issue	250 ml / Bottle
Certified value or range	① Dielectric Constant : (200 MHz ~ 1.4 GHz) 30 ~ 60 ② Dielectric Loss : (200 MHz ~ 1.4 GHz) 0.000 1 ~ 30
Uncertainty	① Dielectric Constant : 2 ② Dielectric Loss : 2
Usage standard	ASTM D7449/D7449M-22 IEC/IEEE 62209-1528 : 2020



127 Certified dielectric reference liquid for Permittivity measurement (type 4/4)

Category 206. Electrical and magnetic properties

Producer Korea Testing Laboratory

Options In Stock **CRM/RM** CRM

Unit of issue	250 ml / Bottle
Certified value or range	① Dielectric Constant : (200 MHz ~ 1.4 GHz) 60 ~ 90 ② Dielectric Loss : (200 MHz ~ 1.4 GHz) 0.000 1 ~ 10
Uncertainty	① Dielectric Constant : 4 ② Dielectric Loss : 2
Usage standard	ASTM D7449/D7449M-22 IEC/IEEE 62209-1528 : 2020

III. Division of Machinery / Material / Energy

〈Reference Material Developed from 2022 to 2023〉





130 High purity copper (type 1/5)

Category 102. Nonferrous metals
Producer Research Institute of Industrial Science and Technology
Options In Stock **CRM/RM** CRM

Unit of issue	Disk, 40 mm dia. x 25 mm thick
Certified value or range	① P : 1~2 mg/kg ② Fe : 64 mg/kg ③ Co : 0.26 mg/kg ④ Ni : 43 mg/kg ⑤ As : 1.2 mg/kg
Uncertainty	≤ 15 %
Usage standard	KS D 1895:2014, ASTM F1845 - 08



131 High purity copper (type 2/5)

Category 102. Nonferrous metals
Producer Research Institute of Industrial Science and Technology
Options In Stock **CRM/RM** CRM

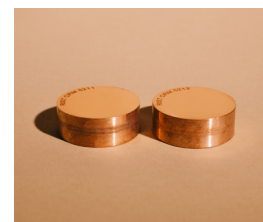
Unit of issue	Disk, 40 mm dia. x 25 mm thick
Certified value or range	① Mg : 93 mg/kg ② Al : 32 mg/kg ③ Si : 80 mg/kg ④ Ti : 0.3 mg/kg ⑤ Cr : 10 mg/kg
Uncertainty	≤ 15 %
Usage standard	KS D 1895:2014, ASTM F1845 - 08



132 High purity copper (type 3/5)

Category 102. Nonferrous metals
Producer Research Institute of Industrial Science and Technology
Options In Stock **CRM/RM** CRM

Unit of issue	Disk, 40 mm dia. x 25 mm thick
Certified value or range	① Ti : 0.1 mg/kg ② Mn : 1.8 mg/kg ③ Fe : 56 mg/kg ④ Ni : 8 mg/kg
Uncertainty	≤ 15 %
Usage standard	KS D 1895:2014, ASTM F1845 - 08



133 High purity copper (type 4/5)

Category 102. Nonferrous metals
Producer Research Institute of Industrial Science and Technology
Options In Stock **CRM/RM** CRM

Unit of issue	Disk, 40 mm dia. x 15 mm thick
Certified value or range	① P : 240 mg/kg ② S : 5.5 mg/kg ③ Ni : 0.7 mg/kg
Uncertainty	≤ 15 %
Usage standard	KS D 1895:2014, ASTM F1845 - 08



122 High purity copper (type 5/5)

Category 102. Nonferrous metals
Producer Research Institute of Industrial Science and Technology
Options In Stock **CRM/RM** CRM

Unit of issue	Disk, 40 mm dia. x 15 mm thick
Certified value or range	① P : 472 mg/kg ② Cr : 0.5 mg/kg ③ Ni : 0.9 mg/kg ④ As : 0.3 mg/kg
Uncertainty	≤ 15 %
Usage standard	KS D 1895:2014, ASTM F1845 - 08



135 CRM for Rockwell Hardness (type 1/2)

Category 207. Metrology
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	60Φ x 10 mm Disk
Certified value or range	30 HRC
Uncertainty	3 HRC
Usage standard	ISO 6508:2005



136 CRM for Rockwell Hardness (type 2/2)

Category 207. Metrology
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	60Φ x 10 mm Disk
Certified value or range	50 HRC
Uncertainty	5 HRC
Usage standard	ISO 6508:2005



137 Aluminum alloy (6005)

Category 102. Nonferrous metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	Disk, 40 mm dia. x 25 mm thick
Certified value or range	① Silicon 0.6-0.9 ② Iron ≤ 0.35 ③ Copper ≤ 0.1 ④ Manganese ≤ 0.1 ⑤ Magnesium 0.4-0.6 Chromium ≤ 0.1
Uncertainty	≤ 10 %
Usage standard	KS D 1851



138 Aluminum alloy (6061)

Category 102. Nonferrous metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	Disk, 40 mm dia. x 25 mm thick
Certified value or range	① Silicon 0.2-0.6 ② Iron ≤ 0.35 ③ Copper ≤ 0.1 ④ Manganese ≤ 0.1 ⑤ Magnesium 0.45-0.9 ⑥ Chromium ≤ 0.1
Uncertainty	$\leq 10\%$
Usage standard	KS D 1851



139 Aluminum alloy (6063)

Category 102. Nonferrous metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	Disk, 40 mm dia. x 25 mm thick
Certified value or range	① Silicon 0.4-0.8 ② Iron ≤ 0.7 ③ Copper 0.15-0.40 ④ Manganese ≤ 0.15 ⑤ Magnesium 0.8-1.2 ⑥ Chromium 0.04-0.35
Uncertainty	$\leq 10\%$
Usage standard	KS D 1851



140 Aluminum alloy (3003)

Category 102. Nonferrous metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	Disk, 40 mm dia. x 25 mm thick
Certified value or range	① Silicon ≤ 0.6 ② Iron ≤ 0.7 ③ Copper 0.05-0.25 ④ Manganese 1.0-1.5
Uncertainty	$\leq 10\%$
Usage standard	KS D 1851



141 Aluminum alloy (3004)

Category 102. Nonferrous metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

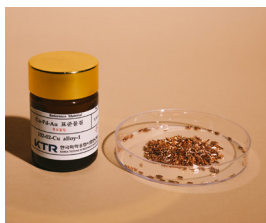
Unit of issue	Disk, 40 mm dia. x 25 mm thick
Certified value or range	① Silicon ≤ 0.3 ② Iron ≤ 0.7 ③ Copper ≤ 0.25 ④ Manganese 1.0-1.5 ⑤ Magnesium 0.8-1.3
Uncertainty	$\leq 10\%$
Usage standard	KS D 1851



142 Aluminum alloy (3005)

Category 102. Nonferrous metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	Disk, 40 mm dia. x 25 mm thick
Certified value or range	① Silicon ≤ 0.6 ② Iron ≤ 0.7 ③ Copper ≤ 0.3 ④ Manganese 1.0-1.5 ⑤ Magnesium 0.2-0.6 ⑥ Chromium ≤ 0.1
Uncertainty	$\leq 10 \%$
Usage standard	KS D 1851



143 Cu-Pd-Au Reference Materials for semiconductor Wire bonding (type 1/2)

Category 102. Nonferrous metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

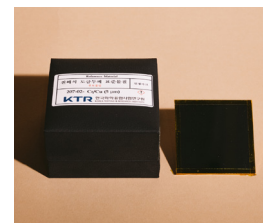
Unit of issue	Pellet 30 g / bottle
Certified value or range	① Pd : 1.025 % ② Au : 0.147 %
Uncertainty	① Pd : 0.060 % ② Au : 0.010 %
Usage standard	KS M 0032 : 2009



144 Cu-Pd-Au Reference Materials for semiconductor Wire bonding (type 2/2)

Category 102. Nonferrous metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

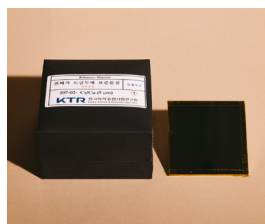
Unit of issue	Pellet 30 g / bottle
Certified value or range	① Pd : 0.989 % ② Au : 0.092 %
Uncertainty	① Pd : 0.025 % ② Au : 0.006 %
Usage standard	KS M 0032 : 2009



145 RM for coulometric coating thickness (type 1/13)

Category 207. Metrology
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

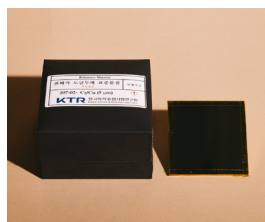
Unit of issue	plate, 50 mm x 50 mm
Certified value or range	Cr (1 ~ 7) μm
Uncertainty	10 %
Usage standard	KS D 0246:2016



146 RM for coulometric coating thickness (type 2/13)

Category 207. Metrology
 Producer Korea Testing & Research Institute
 Options Batch order CRM/RM RM

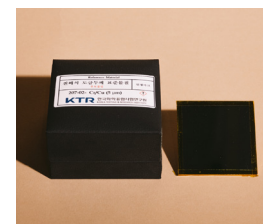
Unit of issue	plate, 50 mm x 50 mm
Certified value or range	Cr (8 ~ 19) μm
Uncertainty	10 %
Usage standard	KS D 0246:2016



147 RM for coulometric coating thickness (type 3/13)

Category 207. Metrology
 Producer Korea Testing & Research Institute
 Options Batch order CRM/RM RM

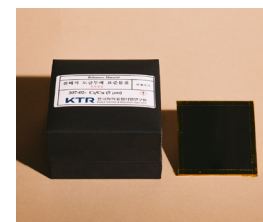
Unit of issue	plate, 50 mm x 50 mm
Certified value or range	Cr (20 ~ 35) μm
Uncertainty	10 %
Usage standard	KS D 0246:2016



148 RM for coulometric coating thickness (type 4/13)

Category 207. Metrology
 Producer Korea Testing & Research Institute
 Options Batch order CRM/RM RM

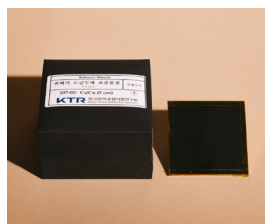
Unit of issue	plate, 50 mm x 50 mm
Certified value or range	Ni (1 ~ 7) μm
Uncertainty	10 %
Usage standard	KS D 0246:2016



149 RM for coulometric coating thickness (type 5/13)

Category 207. Metrology
 Producer Korea Testing & Research Institute
 Options Batch order CRM/RM RM

Unit of issue	plate, 50 mm x 50 mm
Certified value or range	Ni (8 ~ 19) μm
Uncertainty	10 %
Usage standard	KS D 0246:2016



150 RM for coulometric coating thickness (type 6/13)

Category 207. Metrology

Producer Korea Testing & Research Institute

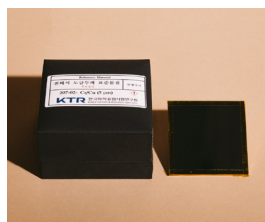
Options Batch order CRM/RM RM

Unit of issue plate, 50 mm x 50 mm

Certified value or range Ni (20 ~ 35) μm

Uncertainty 10 %

Usage standard KS D 0246:2016



151 RM for coulometric coating thickness (type 7/13)

Category 207. Metrology

Producer Korea Testing & Research Institute

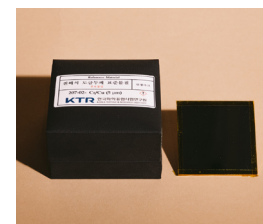
Options Batch order CRM/RM RM

Unit of issue plate, 50 mm x 50 mm

Certified value or range Zn (1 ~ 7) μm

Uncertainty 10 %

Usage standard KS D 0246:2016



152 RM for coulometric coating thickness (type 8/13)

Category 207. Metrology

Producer Korea Testing & Research Institute

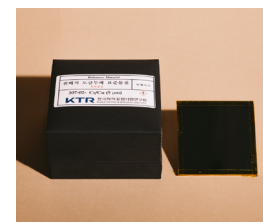
Options Batch order CRM/RM RM

Unit of issue plate, 50 mm x 50 mm

Certified value or range Zn (8 ~ 19) μm

Uncertainty 10 %

Usage standard KS D 0246:2016



153 RM for coulometric coating thickness (type 9/13)

Category 207. Metrology

Producer Korea Testing & Research Institute

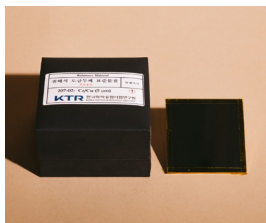
Options Batch order CRM/RM RM

Unit of issue plate, 50 mm x 50 mm

Certified value or range Zn (20 ~ 35) μm

Uncertainty 10 %

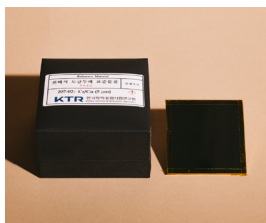
Usage standard KS D 0246:2016



154 RM for coulometric coating thickness (type 10/13)

Category 207. Metrology
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

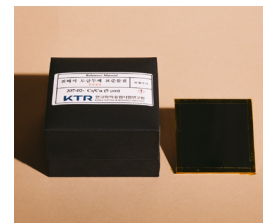
Unit of issue	plate, 50 mm x 50 mm
Certified value or range	Cr (0.1 ~ 1) μm
Uncertainty	10 %
Usage standard	KS D 0246:2016



155 RM for coulometric coating thickness (type 11/13)

Category 207. Metrology
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

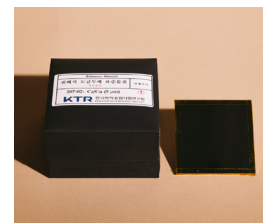
Unit of issue	plate, 50 mm x 50 mm
Certified value or range	Cr (20 ~ 35) μm
Uncertainty	10 %
Usage standard	KS D 0246:2016



156 RM for coulometric coating thickness (type 12/13)

Category 207. Metrology
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue	plate, 50 mm x 50 mm
Certified value or range	Ni (8 ~ 19) μm
Uncertainty	10 %
Usage standard	KS D 0246:2016



157 RM for coulometric coating thickness (type 13/13)

Category 207. Metrology
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue	plate, 50 mm x 50 mm
Certified value or range	Zn (8 ~ 19) μm
Uncertainty	10 %
Usage standard	KS D 0246:2016



158 CRM for C/S/N/O Elemental Analysis (type 1/4)

Category 101. Ferrous metals
Producer Research Institute of Industrial Science and Technology
Options In Stock **CRM/RM** CRM

Unit of issue	100 pins / bottle
Certified value or range	① Oxygen : 0.0047 % ② Nitrogen : 0.0789 % ③ Carbon : 0.0491 % ④ Sulfur : 0.0255 %
Uncertainty	① Oxygen : 0.0004 % ② Nitrogen : 0.0014 % ③ Carbon : 0.0018 % ④ Sulfur : 0.0012 %
Usage standard	KS D 1803, KS D 1804, KS D 1811, KS D ISO 17053



159 CRM for C/S/N/O Elemental Analysis (type 2/4)

Category 101. Ferrous metals
Producer Research Institute of Industrial Science and Technology
Options In Stock **CRM/RM** CRM

Unit of issue	100 pins / bottle
Certified value or range	① Oxygen : 0.0161 % ② Nitrogen : 0.0079 % ③ Carbon : 0.0556 % ④ Sulfur : 0.312 %
Uncertainty	① Oxygen : 0.0016 % ② Nitrogen : 0.0004 % ③ Carbon : 0.0014 % ④ Sulfur : 0.009 %
Usage standard	KS D 1803, KS D 1804, KS D 1811, KS D ISO 17053



160 CRM for C/S/N/O Elemental Analysis (type 3/4)

Category 101. Ferrous metals
Producer Research Institute of Industrial Science and Technology
Options In Stock **CRM/RM** CRM

Unit of issue	100 pins / bottle
Certified value or range	① Oxygen : 0.0029 % ③ Carbon : 0.0125 % ② Nitrogen : 0.0155 % ④ Sulfur : 0.0031 %
Uncertainty	① Oxygen : 0.0004 % ② Nitrogen : 0.0010 % ③ Carbon : 0.0016 % ④ Sulfur : 0.0006 %
Usage standard	KS D 1803, KS D 1804, KS D 1811, KS D ISO 17053



161 CRM for C/S/N/O Elemental Analysis (type 4/4)

Category 101. Ferrous metals
Producer Research Institute of Industrial Science and Technology
Options In Stock **CRM/RM** CRM

Unit of issue	100 pins / bottle
Certified value or range	① Oxygen : 0.0014 % ② Nitrogen : 0.0041 % ③ Carbon : 0.214 % ④ Sulfur : 0.0045 %
Uncertainty	① Oxygen : 0.0004 % ② Nitrogen : 0.0004 % ③ Carbon : 0.010 % ④ Sulfur : 0.0004 %
Usage standard	KS D 1803, KS D 1804, KS D 1811, KS D ISO 17053



162 Zirconia for chemical analysis (type 1/2)

Category 106. Inorganics, rocks, ores

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch Order **CRM/RM** RM

Unit of issue	Powder 40 g / bottle
Certified value or range	① Fe : 10 ~ 50 mg/kg ② Al : 10 ~ 50 mg/kg ③ Mg : 10 ~ 50 mg/kg ④ Na : 10 ~ 50 mg/kg
Uncertainty	20 % (Confidence level 95 %, $k = 2$)
Usage standard	DIN EN 725-12:2001



163 Zirconia for chemical analysis (type 2/2)

Category 106. Inorganics, rocks, ores

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch Order **CRM/RM** RM

Unit of issue	Powder 40 g / bottle
Certified value or range	① Fe : 50 ~ 200 mg/kg ② Al : 50 ~ 200 mg/kg ③ Mg : 50 ~ 200 mg/kg ④ Na : 50 ~ 200 mg/kg
Uncertainty	10 % (Confidence level 95 %, $k = 2$)
Usage standard	DIN EN 725-12:2001



164 Tungsten oxide for chemical analysis (type 1/2)

Category 106. Inorganics, rocks, ores

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch Order **CRM/RM** RM

Unit of issue	Powder 40 g / bottle
Certified value or range	① Fe : 10 ~ 50 mg/kg ② Al : 10 ~ 50 mg/kg ③ Mg : 10 ~ 50 mg/kg ④ Na : 10 ~ 50 mg/kg
Uncertainty	20 % (Confidence level 95 %, $k = 2$)
Usage standard	KICET-QI-10606-121:2022



165 Tungsten oxide for chemical analysis (type 2/2)

Category 106. Inorganics, rocks, ores

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch Order **CRM/RM** RM

Unit of issue	Powder 40 g / bottle
Certified value or range	① Fe : 50 ~ 200 mg/kg ② Al : 50 ~ 200 mg/kg ③ Mg : 50 ~ 200 mg/kg ④ Na : 50 ~ 200 mg/kg
Uncertainty	10 % (Confidence level 95 %, $k = 2$)
Usage standard	KICET-QI-10606-121:2022



166 Platinum-Cobalt alloy catalyst for hydrogen fuel cell (type 1/2)

Category 106. Inorganics, rocks, ores

Producer Korea Testing & Research Institute

Options Batch Order **CRM/RM** RM

Unit of issue	Solid 5 g / bottle
Certified value or range	24.3~30.3 %
Uncertainty	less than 1.1 %
Usage standard	KTRRMP-I-T05-10609-01



168 Platinum-Nickel alloy catalyst for hydrogen fuel cell (type 1/2)

Category 106. Inorganics, rocks, ores

Producer Korea Testing & Research Institute

Options Batch Order **CRM/RM** RM

Unit of issue	Solid 5 g / bottle
Certified value or range	24.3~30.3 %
Uncertainty	less than 1.1 %
Usage standard	KTRRMP-I-T05-10609-01



167 Platinum-Cobalt alloy catalyst for hydrogen fuel cell (type 2/2)

Category 106. Inorganics, rocks, ores

Producer Korea Testing & Research Institute

Options Batch Order **CRM/RM** RM

Unit of issue	Solid 5 g / bottle
Certified value or range	2.2 ~ 3.2 %
Uncertainty	less than 0.3 %
Usage standard	KTRRMP-I-T05-10609-01



169 Platinum-Nickel alloy catalyst for hydrogen fuel cell (type 2/2)

Category 106. Inorganics, rocks, ores

Producer Korea Testing & Research Institute

Options Batch Order **CRM/RM** RM

Unit of issue	Solid 5 g / bottle
Certified value or range	2.2 ~ 3.2 %
Uncertainty	less than 0.3 %
Usage standard	KTRRMP-I-T05-10609-01



170 Manganese sulfate RM for a Cathode material in recycled batteries (type 1/3)

Category 104. High purity chemicals

Producer Korea Testing & Research Institute

Options Batch Order **CRM/RM** RM

Unit of issue Powder 100 g / bottle

Certified value or range Co (20.3 ~ 21.3) %

Uncertainty 10 %

Usage standard KTRRMP-I-T05-10405-01



172 Manganese sulfate RM for a Cathode material in recycled batteries (type 3/3)

Category 104. High purity chemicals

Producer Korea Testing & Research Institute

Options Batch Order **CRM/RM** RM

Unit of issue Powder 100 g / bottle

Certified value or range Ni (0 ~ 100) mg/kg

Uncertainty 30 %

Usage standard KTRRMP-I-T05-10405-01



171 Manganese sulfate RM for a Cathode material in recycled batteries (type 2/3)

Category 104. High purity chemicals

Producer Korea Testing & Research Institute

Options Batch Order **CRM/RM** RM

Unit of issue Powder 100 g / bottle

Certified value or range Mg (0 ~ 100) mg/kg

Uncertainty 30 %

Usage standard KTRRMP-I-T05-10405-01



173 Manganese sulfate RM for a Cathode material in recycled batteries (type 1/4)

Category 104. High purity chemicals

Producer Korea Testing & Research Institute

Options Batch Order **CRM/RM** RM

Unit of issue Powder 100 g / bottle

Certified value or range Mn (31.7 ~ 32.7) %

Uncertainty 10 %

Usage standard KTRRMP-I-T05-10405-01



174 Manganese sulfate RM for a Cathode material in recycled batteries (type 2/4)

Category 104. High purity chemicals
 Producer Korea Testing & Research Institute
 Options Batch Order CRM/RM RM

Unit of issue	Powder 100 g / bottle
Certified value or range	Ca (0 ~ 100) mg/kg
Uncertainty	10 %
Usage standard	KTRRMP-I-T05-10405-01



176 Manganese sulfate RM for a Cathode material in recycled batteries (type 4/4)

Category 104. High purity chemicals
 Producer Korea Testing & Research Institute
 Options Batch Order CRM/RM RM

Unit of issue	Powder 100 g / bottle
Certified value or range	Na (0 ~ 100) mg/kg
Uncertainty	10 %
Usage standard	KTRRMP-I-T05-10405-01



175 Manganese sulfate RM for a Cathode material in recycled batteries (type 3/4)

Category 104. High purity chemicals
 Producer Korea Testing & Research Institute
 Options Batch Order CRM/RM RM

Unit of issue	Powder 100 g / bottle
Certified value or range	Mg (0 ~ 100) mg/kg
Uncertainty	10 %
Usage standard	KTRRMP-I-T05-10405-01



177 Nickel sulfate RM for a Cathode material in recycled batteries (type 1/2)

Category 104. High purity chemicals
 Producer Korea Testing & Research Institute
 Options Batch Order CRM/RM RM

Unit of issue	Powder 100 g / bottle
Certified value or range	Ni (21.5 ~ 22.5) %
Uncertainty	10 %
Usage standard	KTRRMP-I-T05-10405-01



178 Nickel sulfate RM for a Cathode material in recycled batteries (type 2/2)

Category 104. High purity chemicals
 Producer Korea Testing & Research Institute
 Options Batch Order CRM/RM RM

Unit of issue	Powder 100 g / bottle
Certified value or range	Na (0 ~ 100) mg/kg
Uncertainty	10 %
Usage standard	KTRRMP-I-T05-10405-01



180 Lithium carbonate RM for a Cathode material in recycled batteries (type 2/2)

Category 104. High purity chemicals
 Producer Korea Testing & Research Institute
 Options Batch Order CRM/RM RM

Unit of issue	Powder 100 g / bottle
Certified value or range	Na (0 ~ 200) mg/kg
Uncertainty	10 %
Usage standard	KTRRMP-I-T05-10405-01



179 Lithium carbonate RM for a Cathode material in recycled batteries (type 1/2)

Category 104. High purity chemicals
 Producer Korea Testing & Research Institute
 Options Batch Order CRM/RM RM

Unit of issue	Powder 100 g / bottle
Certified value or range	Li (15.8 ~ 16.9) %
Uncertainty	10 %
Usage standard	KTRRMP-I-T05-10405-01



181 Lithium hydroxide RM for a Cathode material in recycled batteries (type 1/2)

Category 104. High purity chemicals
 Producer Korea Testing & Research Institute
 Options Batch Order CRM/RM RM

Unit of issue	Powder 100 g / bottle
Certified value or range	Li (18.0 ~ 19.0) %
Uncertainty	10 %
Usage standard	KTRRMP-I-T05-10405-01



182 Lithium hydroxide RM for a Cathode material in recycled batteries (type 2/2)

Category 104. High purity chemicals

Producer Korea Testing & Research Institute

Options Batch Order **CRM/RM** RM

Unit of issue Powder 100 g / bottle

Certified value or range Na (0 ~ 200) mg/kg

Uncertainty 10 %

Usage standard KTRMP-I-T05-10405-01



184 Hafnium Chloride reference material for semiconductor processing

Category 106. Inorganics, rocks, ores

Producer Korea Testing & Research Institute

Options Batch Order **CRM/RM** RM

Unit of issue Powder 10 g / bottle

Certified value or range Zr : 4.6 mg/kg

Uncertainty 0.5 mg/kg

Usage standard KTRMP-I-T05-10609b-01



183 Aluminum Chloride reference material for semiconductor processing

Category 106. Inorganics, rocks, ores

Producer Korea Testing & Research Institute

Options Batch Order **CRM/RM** RM

Unit of issue Powder 10 g / bottle

Certified value or range Ga : 15.9 mg/kg

Uncertainty 1.0 mg/kg

Usage standard KTRMP-I-T05-10609a-01



185 Used auto catalysts for precious metal analysis (type 1/2)

Category 106. Inorganics, rocks, ores

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch Order **CRM/RM** RM

Unit of issue Powder 70 g / bottle

Certified value or range
① Pt : 1 839 mg/kg
② Pd : 2 155 mg/kg
③ Rh : 182.2 mg/kg

Uncertainty
① Pt : 128 mg/kg
② Pd : 96 mg/kg
③ Rh : 10.5 mg/kg

Usage standard KICET-QI-10609-009:2022



186 Used auto catalysts for precious metal analysis (type 2/2)

Category 106. Inorganics, rocks, ores
Producer Korea Institute of Ceramic Engineering and Technology
Options Batch Order **CRM/RM** RM

Unit of issue	Powder 70 g / bottle
Certified value or range	① Pt : 339.4 mg/kg ② Pd : 907.9 mg/kg ③ Rh : 71.81 mg/kg
Uncertainty	① Pt : 31.9 mg/kg ② Pd : 53.2 mg/kg ③ Rh : 6.82 mg/kg
Usage standard	KICET-QI-10609-009:2022



187 Cerium oxide for chemica analysis (type 1/3)

Category 106. Inorganics, rocks, ores
Producer Korea Institute of Ceramic Engineering and Technology
Options Batch Order **CRM/RM** RM

Unit of issue	Powder 15 g / bottle
Certified value or range	Zr : (1 800 ~ 2 300) mg/kg
Uncertainty	10 % (Confidence level 95 %, $k = 2$)
Usage standard	KICET-QI-10606-114:2022



188 Cerium oxide for chemica analysis (type 2/3)

Category 106. Inorganics, rocks, ores
Producer Korea Institute of Ceramic Engineering and Technology
Options Batch Order **CRM/RM** RM

Unit of issue	Powder 15 g / bottle
Certified value or range	Zr : (550 ~ 650) mg/kg
Uncertainty	10 % (Confidence level 95 %, $k = 2$)
Usage standard	KICET-QI-10606-114:2022



189 Cerium oxide for chemica analysis (type 3/3)

Category 106. Inorganics, rocks, ores
Producer Korea Institute of Ceramic Engineering and Technology
Options Batch Order **CRM/RM** RM

Unit of issue	Powder 15 g / bottle
Certified value or range	Zr : (100 ~ 150) mg/kg
Uncertainty	10 % (Confidence level 95 %, $k = 2$)
Usage standard	KICET-QI-10606-114:2022

IV. Division of Chemistry / Biology

〈Reference Material Developed from 2021 to 2022〉





190 Synthetic genomic RNA of RVFV lineage A strain

Category 111. Clinical and biochemical substance
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** RM

Unit of issue copy / μL

Certified value or range
 ① L : 1.5×10^6
 ② M : 1.4×10^6
 ③ S : 2.5×10^6

Uncertainty
 ① L : 2.0×10^5
 ② M : 1.9×10^5
 ③ S : 3.5×10^5

Usage standard Measurement of S, M, L segment based on ddPCR



192 Synthetic genomic RNA of RVFV lineage K strain

Category 111. Clinical and biochemical substance
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** RM

Unit of issue copy / μL

Certified value or range
 ① L : 7.8×10^4
 ② M : 8.9×10^4
 ③ S : 8.6×10^4

Uncertainty
 ① L : 1.3×10^4
 ② M : 1.3×10^4
 ③ S : 1.3×10^4

Usage standard Measurement of S, M, L segment based on ddPCR



191 Synthetic genomic RNA of RVFV lineage D strain

Category 111. Clinical and biochemical substance
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** RM

Unit of issue copy / μL

Certified value or range
 ① L : 1.8×10^5
 ② M : 1.1×10^5
 ③ S : 1.3×10^5

Uncertainty
 ① L : 2.9×10^4
 ② M : 1.5×10^4
 ③ S : 1.8×10^4

Usage standard Measurement of S, M, L segment based on ddPCR



193 Polyethylene reference material for analysis of heavy metal (2 types)

Category 113. Polymers
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** RM

Unit of issue pellet 15 g / bottle, Disk

Certified value or range
 ① Sn : (504 ~ 592) mg/kg
 ② Sb : (1638 ~ 1945) mg/kg

Uncertainty Within 10 % (Confidence level about 95 %, $k = 2$)

Usage standard Characterization using an inductively coupled plasma optical emission spectrometry based on IEC 62321-5:2013.



194 Polyethylene reference material for analysis of heavy metal (2 types)

Category 113. Polymers
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** RM

Unit of issue	pellet 15 g / bottle, Disk
Certified value or range	① Sn : (114 ~ 139) mg/kg ② Sb : (358 ~ 435) mg/kg
Uncertainty	Within 10 % (Confidence level about 95 %, $k = 2$)
Usage standard	Charaterization using a inductively coupled plasma optical emission spectrometry based on IEC 62321-5:2013.



196 Standard Substance for MIT/CMIT Quantitative Analysis of Liquid-type Cleaner

Category 110. Health and industry hygiene
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue	18 g / bottle
Certified value or range	① MIT (2-methyl-4-isothiazolin-3-one) : (25 ~ 45) mg/kg ② CMIT (5-chloro-2-methyl-4-isothiazolin-3-one) : (75 ~ 135) mg/kg
Uncertainty	20 % (Confidence level about 95 %, $k = 2$)
Usage standard	NIER Notice No.2022-26 (Regulations on test and inspection standards and methods for household chemical products subject to safety confirmation chapter4 7.1 MIT, CMIT-LC/MS)



195 Standard Substance for MIT/CMIT Quantitative Analysis of Cream-type Cosmetics

Category 110. Health and industry hygiene
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue	Cream 18 g / bottle
Certified value or range	① MIT (2-methyl-4-isothiazolin-3-one) : (2 ~ 4) mg/kg ② CMIT (5-chloro-2-methyl-4-isothiazolin-3-one) : (6 ~ 12) mg/kg
Uncertainty	20 % (Confidence level about 95 %, $k = 2$)
Usage standard	NIER Notice No.2022-26 (Regulations on test and inspection standards and methods for household chemical products subject to safety confirmation chapter4 7.1 MIT, CMIT-LC/MS)



197 Development and dissemination of secondary reference materials in the form of dyeing fabrics with homogeneity and stability within 5 % including 6 or more types of allergenic disperse dyes

Category 113. Polymers
Producer KOTITI Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue	5 g / Pack
Certified value or range	① Polyester_Low conc. : (20 ~ 50) mg/kg ② Acetate_Low conc. : (20 ~ 50) mg/kg ③ Polyester_High conc. : (70 ~ 100) mg/kg ④ Acetate_High conc. : (70 ~ 100) mg/kg
Uncertainty	10 % (Confidence level about 95 %, $k = 2$)
Usage standard	KS K 0736:2019



198 Reference material for detecting Norovirus (GI) RNA

Category 110. Health and industry hygiene

Producer Korea Research Institute of Standards and Science

Options Batch order **CRM/RM** RM

Unit of issue	0.1 mL / bottle
Certified value or range	1.91.E+04 cp/μL
Uncertainty	Not Applicable
Usage standard	ISO 20395:2019, procedure for measuring sequence-specific RNA by nucleic acid amplification method(KRISS T-09-013)



200 Human rhinovirus RNA

Category 110. Health and industry hygiene

Producer Korea Research Institute of Standards and Science

Options Batch order **CRM/RM** RM

Unit of issue	0.1 mL / bottle
Certified value or range	1.3. E+05 cp/μL
Uncertainty	Not Applicable
Usage standard	ISO 20395:2019, procedure for measuring sequence-specific RNA by nucleic acid amplification method(KRISS T-09-013)



199 Reference material for detecting Norovirus (GII) RNA

Category 110. Health and industry hygiene

Producer Korea Research Institute of Standards and Science

Options Batch order **CRM/RM** RM

Unit of issue	0.1 mL / bottle
Certified value or range	1.20.E+04 cp/μL
Uncertainty	Not Applicable
Usage standard	ISO 20395:2019, procedure for measuring sequence-specific RNA by nucleic acid amplification method(KRISS T-09-013)



201 Human Alphacoronavirus 229E RNA

Category 110. Health and industry hygiene

Producer Korea Research Institute of Standards and Science

Options Batch order **CRM/RM** RM

Unit of issue	0.1 mL / bottle
Certified value or range	① RdRp gene : 2.03.E+03 cp/μL ② N gene : 6.39.E+03 cp/μL
Uncertainty	Not Applicable
Usage standard	ISO 20395:2019, procedure for measuring sequence-specific RNA by nucleic acid amplification method(KRISS T-09-013)



202 Emulsion, fat fraction I (for medical imaging)

Category 111. Clinical and Biochemical Materials

Producer Korea Research Institute of Standards and Science

Options Batch order **CRM/RM** RM

Unit of issue 15 mL / bottle

Certified value
or range 9.12 %

Uncertainty 0.02 % (Confidence level about 95 %, $k = 2$)

Usage standard R-111-015-2022



204 Emulsion, fat fraction III (for medical imaging)

Category 111. Clinical and Biochemical Materials

Producer Korea Research Institute of Standards and Science

Options Batch order **CRM/RM** RM

Unit of issue 15 mL / bottle

Certified value
or range 27.86 %

Uncertainty 0.05 % (Confidence level about 95 %, $k = 2$)

Usage standard R-111-015-2022



203 Emulsion, fat fraction II (for medical imaging)

Category 111. Clinical and Biochemical Materials

Producer Korea Research Institute of Standards and Science

Options Batch order **CRM/RM** RM

Unit of issue 15 mL / bottle

Certified value
or range 18.32 %

Uncertainty 0.04 % (Confidence level about 95 %, $k = 2$)

Usage standard R-111-015-2022

V. Division of Electricity / Electron / Ceramic

〈Reference Material Developed from 2021 to 2022〉





205 RGO Graphene for the number of layers and inter-layer distances (XRD, 10 Layers)

Category 207. Metrology

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order CRM/RM CRM

Unit of issue powder 0.6 g / bottle

Certified value or range
① layers : 9.5 ~ 10.5
② Å : 3.553 ~ 3.613

Uncertainty Not Applicable

Usage standard KICET-QI-20709-01:2021



206 RGO Graphene for the number of layers and inter-layer distances (XRD, 3 Layers)

Category 207. Metrology

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order CRM/RM CRM

Unit of issue powder 0.6 g / bottle

Certified value or range
① layers : 2.7 ~ 3.7
② Å : 3.626 ~ 3.686

Uncertainty Not Applicable

Usage standard KICET-QI-20709-01:2021



207 RM of cathode active materials for secondary batteries (NCM523)

Category 106. Inorganics, Rocks, Ores

Producer Korea Testing & Research Institute

Options Batch order CRM/RM RM

Unit of issue powder 100 g / bottle

Certified value or range
① Ni : 30.3 %
② Co : 13.3 %
③ Mn : 16.2 %

Uncertainty
① Ni : 0.8 %
② Co : 0.4 %
③ Mn : 0.4 %
(Confidence level about 95 %, $k = 2$)

Usage standard KTRRMP-I-T05-10609-01



208 RM of cathode active materials for secondary batteries (NCM622)

Category 106. Inorganics, Rocks, Ores

Producer Korea Testing & Research Institute

Options Batch order CRM/RM RM

Unit of issue powder 100 g / bottle

Certified value or range
① Ni : 36.5 %
② Co : 11.9 %
③ Mn : 11.0 %

Uncertainty
① Ni : 0.9 %
② Co : 0.4 %
③ Mn : 0.3 %
(Confidence level about 95 %, $k = 2$)

Usage standard KTRRMP-I-T05-10609-01



209 RM of cathode active materials for secondary batteries (NCM811)

Category 106. Inorganics, Rocks, Ores
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue powder 100 g / bottle

Certified value or range
 ① Ni : 49.8 %
 ② Co : 6.58 %
 ③ Mn : 3.34 %

Uncertainty
 ① Ni : 1.4 % (Confidence level 95 %, $k = 2.26$)
 ② Co : 0.40 % (Confidence level 95 %, $k = 2.57$)
 ③ Mn : 0.13 % (Confidence level about 95 %, $k = 2$)

Usage standard KTRMP-I-T05-10609-01



210 Ga CRM for non-contact temperature measurement

Category 203. Thermodynamic properties
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** CRM

Unit of issue Cylindrical type / $\phi 64 \times t20$

Certified value or range (27.8 ~ 31.8) °C

Uncertainty 0.4 °C (Confidence level about 95 %, $k = 2$)

Usage standard ASTM E 1256:2017



211 In CRM for non-contact temperature measurement

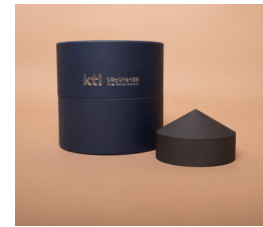
Category 203. Thermodynamic properties
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** CRM

Unit of issue Conical type / $\phi 64 \times t20$

Certified value or range (154.6 ~ 159.6) °C

Uncertainty 0.4 °C (Confidence level about 95 %, $k = 2$)

Usage standard ASTM E 1256:2017



212 Sn CRM for non-contact temperature measurement

Category 203. Thermodynamic properties
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** CRM

Unit of issue Conical type / $\phi 64 \times t20$

Certified value or range (229.9 ~ 233.9) °C

Uncertainty 0.4 °C (Confidence level about 95 %, $k = 2$)

Usage standard ASTM E 1256:2017

VI. Division of Machinery / Material / Energy

〈Reference Material Developed from 2021 to 2022〉





213 Micro Scale Certified Reference Materials for Calibration of Microscope

Category 207. Metrology
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** CRM

Unit of issue	Specimen : 10 mm x 10 mm, Silicon wafer(Including Zig : Diameter 25 mm)
Certified value or range	① Pitch : (0.90~1.10) μm ② Pitch : (1.90~2.10) μm ③ Pitch : (4.8~5.2) μm ④ Pitch : (9.7~10.3) μm
Uncertainty	① Pitch : (0.90~1.10) μm : 0.04 μm (Confidence level about 95 %, $k = 2$) ② Pitch : (1.90~2.10) μm : 0.06 μm (Confidence level about 95 %, $k = 2$) ③ Pitch : (4.8~5.2) μm : 0.2 μm (Confidence level about 95 %, $k = 2$) ④ Pitch : (9.7~10.3) μm : 0.3 μm (Confidence level about 95 %, $k = 2$)
Usage standard	ISO 11952:2019



214 Stage Micrometer (1 mm & 5 mm / 100 div.)

Category 207. Metrology
Producer Korea Research Institute of Standards and Science
Options Individual order **CRM/RM** RM

Unit of issue	Specimen : Chromium lines on quartz-glass substrate (76 mm x 25 mm x 2.3 mm) Microscales : 1 mm (100 div.) & 5 mm (100 div.)
Certified value or range	Line spacing of individual scale lines from the reference line (Nominal scale division : 10 μm for 1 mm scale & 50 μm for 5 mm scale)
Uncertainty	$U = Q[40 \text{ nm}, 8.3\text{E-}6 \times L]$ (L : 선간거리 / Confidence level about 95 %, $k = 2$)
Usage standard	ISO/IEC Guide 98-3



215 Ag-Ni Alloy (AgNi10) reference material

Category 102. Non Ferrous Metals
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue	30 g / bottle
Certified value or range	① Ag : 88.9 % ② Ni : 10.8 %
Uncertainty	① Ag : 0.3 % ② Ni : 0.3 % (Confidence level about 95 %, $k = 2$)
Usage standard	KS D 2000



216 Ag-Ni Alloy (AgNi20) reference material

Category 102. Non Ferrous Metals
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue	30 g / bottle
Certified value or range	① Ag : 79.2 % ② Ni : 20.6 %
Uncertainty	① Ag : 0.2 % ② Ni : 0.3 % (Confidence level about 95 %, $k = 2$)
Usage standard	KS D 2000



217 Vickers hardness reference material for high hardness – Low Level

Category306. Mechanical properties

ProducerResearch Institute of Industrial Science and Technology(RIST)

OptionsBatch orderCRM/RMCRM

Unit of issue	Disk / ø25 x t10
Certified value or range	Vickers Hardness <1,000 HV
Uncertainty	10 % or less
Usage standard	ISO 6507-2,3



219 Vickers hardness reference material for high hardness – high Level

Category306. Mechanical properties

ProducerResearch Institute of Industrial Science and Technology(RIST)

OptionsBatch orderCRM/RMCRM

Unit of issue	Disk / ø25 x t10
Certified value or range	Vickers Hardness ≥ 1,500 HV
Uncertainty	10 % or less
Usage standard	ISO 6507-2,3



218 Vickers hardness reference material for high hardness – Medium Level

Category306. Mechanical properties

ProducerResearch Institute of Industrial Science and Technology(RIST)

OptionsBatch orderCRM/RMCRM

Unit of issue	Disk / ø25 x t10
Certified value or range	1,000 HV < Vickers Hardness <1,500 HV
Uncertainty	10 % or less
Usage standard	ISO 6507-2,3

VII. Division of Chemistry / Biology

〈Reference Material Developed from 2021 to 2022〉





220 Hydrogen Fluoride(HF)

Category 112. Gaseous Materials

Producer RIGAS Co.,Ltd.

Options Individual order **CRM/RM** CRM

Unit of issue	Gas 10 MPa / 10 L
Certified value or range	HF : 50 $\mu\text{mol/mol}$ in Nitrogen
Uncertainty	10 % (Confidence level about 95 %, $k = 2$)
Usage standard	KS I ISO 6142, KS I ISO 6143



222 Phosphine certified reference material for semiconductor process

Category 112. Gaseous Materials

Producer Korea Research Institute of Standards and Science

Options Individual order **CRM/RM** CRM

Unit of issue	Gas / 10 L
Certified value or range	PH_3 : 100 $\mu\text{mol/mol}$ / N_2
Uncertainty	2 % (Confidence level 95 %, $k = 2$)
Usage standard	R-112-001-2017



221 Tetrafluorosilane certified reference material for semiconductor process

Category 112. Gaseous Materials

Producer Korea Research Institute of Standards and Science

Options Individual order **CRM/RM** CRM

Unit of issue	Gas / 10 L
Certified value or range	SiF_4 : 10 $\mu\text{mol/mol}$ / N_2
Uncertainty	2 % (Confidence level 95 %, $k = 2$)
Usage standard	R-112-001-2017



223 Diborane certified reference material for semiconductor process

Category 112. Gaseous Materials

Producer Korea Research Institute of Standards and Science

Options Individual order **CRM/RM** CRM

Unit of issue	Gas / 10 L
Certified value or range	B_2H_6 : 100 $\mu\text{mol/mol}$ / He
Uncertainty	2 % (Confidence level 95 %, $k = 2$)
Usage standard	R-112-001-2017



224 High density polyethylene for cytotoxicity test

Category 114. Other Chemical Composition

Producer Korea Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue sheet (3 cm X 10 cm) / ea

Certified value or range Plating efficiency : (80 ~ 110) %

Uncertainty Not Applicable

Usage standard ISO 10993-5 Annex B, Colony formation cytotoxicity test



226 ZDBC polyurethane for cytotoxicity test

Category 114. Other Chemical Composition

Producer Korea Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue sheet (15 cm X 10 cm) / ea

Certified value or range Plating efficiency : (0 ~ 30) %

Uncertainty Not Applicable

Usage standard ISO 10993-5 Annex B, Colony formation cytotoxicity test



225 ZDEC polyurethane for cytotoxicity test

Category 114. Other Chemical Composition

Producer Korea Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue sheet (15 cm X 10 cm) / ea

Certified value or range Plating efficiency : (0 ~ 30) %

Uncertainty Not Applicable

Usage standard ISO 10993-5 Annex B, Colony formation cytotoxicity test



227 Pb, As cosmetic certified reference material for quantitative analysis

Category 114. Other Chemical Composition

Producer Korea Testing & Research Institute

Options Batch order **CRM/RM** CRM

Unit of issue Cream 20 g / bottle

Certified value or range
① Pb : (15 ~ 25) mg/kg
② As : (5 ~ 15) mg/kg

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard MFDS Notice No. 2020-12
1. Lead(Pb) D) Method using inductively coupled plasma-mass spectrometer
3. Arsenic(As) D) Method using inductively coupled plasma-mass spectrometer



228 Sb, Cd, Ni cosmetic reference material for quantitative analysis

Category 114. Other Chemical Composition

Producer Korea Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue Cream 20 g / bottle

Certified value or range
 ① Sb : (12 ~ 16) mg/kg
 ② Cd : (3 ~ 8) mg/kg
 ③ Ni : (8 ~ 12) mg/kg

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard MFDS Notice No. 2020-12
 2. Nickel(Ni) 5. Antimony(Sb) 6.Cadmium(Cd)



229 Hg cosmetic reference material for quantitative analysis

Category 114. Other Chemical Composition

Producer Korea Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue Cream 20 g / bottle

Certified value or range Hg : (0.5 ~ 1.5) mg/kg

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard MFDS Notice No. 2020-12
 4. Mercury(Hg) B) Method using mercury analyzer



230 SCCPs (55.5 % Cl, ABS) (2 types)

Category 113. Polymers

Producer Korea Conformity Laboratory

Options Batch order **CRM/RM** RM

Unit of issue pellet 20 g / bottle

Certified value or range
 ① SCCPs : (0.1 ~ 0.2) %
 ② SCCPs : (0.03 ~ 0.08) %

Uncertainty Not Applicable

Usage standard GB/T 33345-2016



231 ABS Reference material for the analysis of chlorinated flame retardants (2 types)

Category 113. Polymers

Producer Korea Testing Laboratory

Options Batch order **CRM/RM** RM

Unit of issue powder 30 g / bottle

Certified value or range
 ① Tris(2-chloroethyl) phosphate(TCEP) : (600 ~ 1 000) mg/kg
 ② Tris(2-chloroethyl) phosphate(TCEP) : (80 ~ 120) mg/kg

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard KS M 1083:2019



232 ABS Reference material for the analysis of brominated flame retardants (2 types)

Category 113. Polymers
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** CRM

Unit of issue	powder 10 g / bottle
Certified value or range	① Decabromodiphenyl ether(BDE-209) : (800 ~ 1 200) mg/kg ② Decabromodiphenyl ether(BDE-209) : (90 ~ 140) mg/kg
Uncertainty	10 % (Confidence level about 95 %, $k = 2$)
Usage standard	IEC62321-6:2015



234 Staphylococcus aureus qualitative reference material

Category 110. Health and Industry Hygiene
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue	Freeze-dried microorganisms (1 ball) / vial
Certified value or range	Scientific name : Staphylococcus aureus
Uncertainty	Not Applicable
Usage standard	KTRMP-I-T05-110B0-03



233 Staphylococcus aureus quantitative reference material

Category 110. Health and Industry Hygiene
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue	Freeze-dried microorganisms (1 ball) / vial
Certified value or range	Viable count : (2 ~ 7) log ₁₀ CFU
Uncertainty	Not Applicable
Usage standard	「Standards and specification of food」 MFDS No. 2020-3 8. general test method 4.5 bacterial count 4.5.1. general bacterial count, dry film method



235 Escherichia coli quantitative reference material

Category 110. Health and Industry Hygiene
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue	Freeze-dried microorganisms (1 ball) / vial
Certified value or range	Viable count : (2 ~ 7) log ₁₀ CFU
Uncertainty	Not Applicable
Usage standard	「Standards and specification of food」 MFDS No. 2020-3 8. general test method 4.5 bacterial count 4.5.1. general bacterial count, dry film method



236 Escherichia coli qualitative reference material

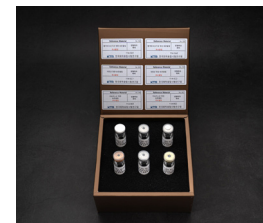
Category 110. Health and Industry Hygiene
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue Freeze-dried microorganisms (1 ball) / vial

Certified value or range Scientific name : Escherichia coli

Uncertainty Not Applicable

Usage standard KTRRMP-I-T05-110B0-03



238 Bacillus subtilis qualitative reference material

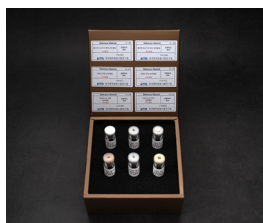
Category 110. Health and Industry Hygiene
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue Freeze-dried microorganisms (1 ball) / vial

Certified value or range Scientific name : Bacillus subtilis

Uncertainty Not Applicable

Usage standard KTRRMP-I-T05-110B0-03



237 Bacillus subtilis quantitative reference material

Category 110. Health and Industry Hygiene
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue Freeze-dried microorganisms (1 ball) / vial

Certified value or range Viable count : (2 ~ 7) log₁₀ CFU

Uncertainty Not Applicable

Usage standard 「Standards and specification of food」 MFDS No. 2020-3
 8. general test method 4.5 bacterial count
 4.5.1. general bacterial count, dry film method



239 Hazardous heavy metals in coal fly ash (Low)

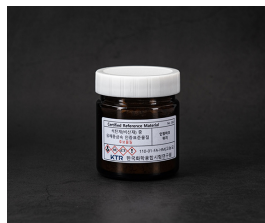
Category 110. Health and Industry Hygiene
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** CRM

Unit of issue powder 50 g / bottle

Certified value or range ① As : (13 ~ 16) mg/kg ② Cd : (0.34 ~ 0.45) mg/kg ③ Cr : (34 ~ 42) mg/kg
 ④ Cu : (70 ~ 87) mg/kg ⑤ Ni : (44 ~ 55) mg/kg ⑥ Pb : (40 ~ 50) mg/kg
 ⑦ Zn : (77 ~ 95) mg/kg ⑧ Hg : (0.25 ~ 0.31) mg/kg

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard EPA 6010D, KS L ISO 26845, EPA 7473



240 Hazardous heavy metals in coal fly ash (High)

Category 110. Health and Industry Hygiene
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** CRM

Unit of issue	powder 50 g / bottle
Certified value or range	① As : (32 ~ 40) mg/kg ② Cd : (28 ~ 35) mg/kg ③ Cr : (42 ~ 53) mg/kg ④ Cu* : (720 ~ 881) mg/kg ⑤ Ni : (102 ~ 125) mg/kg ⑥ Pb : (205 ~ 252) mg/kg ⑦ Zn : (301 ~ 368) mg/kg ⑧ Hg : (10 ~ 14) mg/kg
Uncertainty	10 % (Confidence level about 95 %, $k = 2$) *Cu : 10 % (Confidence level 95 %, $k = 2.57$)
Usage standard	EPA 6010D, EPA 7473



241 Benzoic acid

Category 203. Thermodynamic properties
Producer Korea Conformity Laboratory
Options Batch order **CRM/RM** CRM

Unit of issue	1 g / tablet, 100 tablet / bottle
Certified value or range	Heat of combustion : (26 393 ~ 26 515) J/g
Uncertainty	max. 0.7 % (Confidence level 95 %, $k = 2.45$)
Usage standard	ISO 1928:2020



242 Spectrometric oil standard(D3) (Lubricating oil)

Category 105. Calibration Solutions
Producer Kemidas Co.,Ltd.
Options Batch order **CRM/RM** CRM

Unit of issue	240 mL / bottle
Certified value or range	① B : (2 ~ 120) mg/kg ② Mo : (2 ~ 120) mg/kg ③ Zn : (2 ~ 120) mg/kg
Uncertainty	(0.5 ~ 20) % (Confidence level about 95 %, $k = 2$)
Usage standard	ASTM D5185-18



243 Spectrometric oil standard(D12) (Lubricating oil)

Category 105. Calibration Solutions
Producer Kemidas Co.,Ltd.
Options Batch order **CRM/RM** CRM

Unit of issue	240 mL / bottle
Certified value or range	① Al : (2 ~ 120) mg/kg ② Cr : (2 ~ 120) mg/kg ③ Cu : (2 ~ 120) mg/kg ④ Fe : (2 ~ 120) mg/kg ⑤ Pb : (2 ~ 120) mg/kg ⑥ Mg : (2 ~ 120) mg/kg ⑦ Ni : (2 ~ 120) mg/kg ⑧ Si : (2 ~ 120) mg/kg ⑨ Ag : (2 ~ 120) mg/kg ⑩ Na : (2 ~ 120) mg/kg ⑪ Sn : (2 ~ 120) mg/kg ⑫ Ti : (2 ~ 120) mg/kg
Uncertainty	(0.5 ~ 20) % (Confidence level about 95 %, $k = 2$)
Usage standard	ASTM D5185-18



244 Spectrometric oil standard(D19) (Lubricating oil)

Category 105. Calibration Solutions

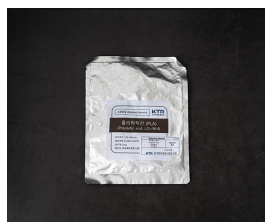
Producer Kemidas Co.,Ltd.

Options Batch order **CRM/RM** CRM

Unit of issue	240 mL / bottle		
Certified value or range	① Al : (2 ~ 120) mg/kg	② Ba : (2 ~ 120) mg/kg	③ B : (2 ~ 120) mg/kg
	④ Cr : (2 ~ 120) mg/kg	⑤ Cu : (2 ~ 120) mg/kg	⑥ Fe : (2 ~ 120) mg/kg
	⑦ Pb : (2 ~ 120) mg/kg	⑦ Mg : (2 ~ 120) mg/kg	⑨ Mn : (2 ~ 120) mg/kg
	⑩ Mo : (2 ~ 120) mg/kg	⑪ Ni : (2 ~ 120) mg/kg	⑫ Si : (2 ~ 120) mg/kg
	⑬ Ag : (2 ~ 120) mg/kg	⑭ Na : (2 ~ 120) mg/kg	⑮ Sn : (2 ~ 120) mg/kg
	⑯ Ti : (2 ~ 120) mg/kg	⑰ V : (2 ~ 120) mg/kg	⑱ Zn : (2 ~ 120) mg/kg
	⑲ Cd : (2 ~ 120) mg/kg		

Uncertainty (0.5 ~ 20) % (Confidence level about 95 %, $k = 2$)

Usage standard ASTM D5185-18, EPA 3040A:1996



245 Medical polymer Polylactic acid(PLA) reference material

Category 113. Polymers

Producer Korea Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue	powder 30 g / pouch
Certified value or range	Loss of sample mass : (6 ~ 10) % (6 month, 37 °C, PBS)
Uncertainty	Not Applicable
Usage standard	ISO 13781



246 Polyethylene certified standard material for bromine quantitative analysis

Category 113. Polymers

Producer Korea Testing & Research Institute

Options Batch order **CRM/RM** CRM

Unit of issue	pellet 20 g / bottle
Certified value or range	① Br : (250 ~ 320) mg/kg
	② Br : (900 ~ 1 100) mg/kg
Uncertainty	10 % (Confidence level about 95 %, $k = 2$)
Usage standard	IEC 62321-3-2



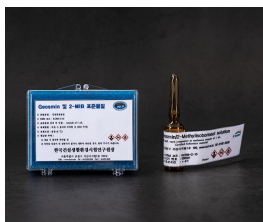
247 Polyester fabric for the analysis of per and polyfluoroalkyl substances(PFAS) certified reference Material

Category 114. Other Chemical Composition

Producer KOTITI Testing & Research Institute

Options Batch order **CRM/RM** CRM

Unit of issue	10 g / Pack
Certified value or range	① PFOA (Perfluoro-n-octanoic acid) : (1 ~ 25) µg/kg
	② PFOS (Perfluorooctanesulfonic acid) : (1 ~ 25) µg/kg
Uncertainty	10 % (Confidence level about 95 %, $k = 2$)
Usage standard	KS M 9722:2017



248 Geosmin/2-MIB (methanol)

Category 109. Environmental Pollutions

Producer Korea Conformity Laboratory

Options Batch order **CRM/RM** CRM

Unit of issue 1 mL / bottle

Certified value or range Geosmin/2-MIB mixture : (70 ~ 130) ng/mL

Uncertainty max. 10 % (Confidence level about 95 %, $k = 2$)

Usage standard Test method for drinking water quality monitoring items
(related to Article 6 (3)) Geosmin and 2-MIB
(Gas chromatograph-mass spectrometer analysis)



249 Cement for chemical composition

Category 106. Inorganics, Rocks, Ores

Producer Korea Conformity Laboratory

Options Batch order **CRM/RM** RM

Unit of issue powder 4 g / bottle, 2 bottle / 1 box

Certified value or range
① CaO : (63 ~ 69) %
② SiO₂ : (19 ~ 23) %
③ Al₂O₃ : (4 ~ 6) %

Uncertainty Not Applicable

Usage standard KS L 5120:2021



250 Cement for Blaine surface

Category 301. Sizing

Producer Korea Conformity Laboratory

Options Batch order **CRM/RM** RM

Unit of issue powder 12 g / bottle, 2 bottle / 1 box

Certified value or range Blaine surface : (3 000 ~ 4 000) cm²/g

Uncertainty Not Applicable

Usage standard KS L 5106:2009



251 Cement for heavy metal contents

Category 106. Inorganics, Rocks, Ores

Producer Korea Conformity Laboratory

Options Batch order **CRM/RM** RM

Unit of issue powder 12 g / bottle, 2 bottle / 1 box

Certified value or range
① Pb : (30 ~ 70) mg/kg ② Cu : (70 ~ 130) mg/kg ③ Cr⁶⁺ : (1 ~ 10) mg/kg
④ As : (5 ~ 20) mg/kg ⑤ Hg : (1 ~ 5) mg/kg ⑥ Cd : (4 ~ 10) mg/kg

Uncertainty Not Applicable

Usage standard EPA-3051A, KS L 5221:2017

VIII. Division of Electricity / Electron / Ceramic

〈Reference Material Developed from 2020 to 2021〉





252 (100 mm wafer dia) Certified reference material for the thickness of a thin film layer of silicon dioxide grown on silicon (10 types)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual order CRM/RM CRM

Unit of issue	Diameter of wafer : 100 mm				
Certified value or range	① 3.12 nm	② 5.10 nm	③ 10.50 nm	④ 21.6 nm	⑤ 30.57 nm
	⑥ 40.43 nm	⑦ 48.92 nm	⑧ 101.46 nm	⑨ 198.39 nm	⑩ 494.8 nm
Uncertainty	① 0.61 nm	② 0.66 nm	③ 0.65 nm	④ 0.5 nm	⑤ 0.39 nm
	⑥ 0.35 nm	⑦ 0.33 nm	⑧ 0.31 nm	⑨ 0.59 nm	⑩ 1.3 nm
	(Confidence level 95 %, $k = 2$)				
Usage standard	KRISS R-207-016 (2021)				



253 (150 mm wafer dia) Certified reference material for the thickness of a thin film layer of silicon dioxide grown on silicon (10 types)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual order CRM/RM CRM

Unit of issue	Diameter of wafer : 150 mm					
Certified value or range	① 3.12 nm	② 5.12 nm	③ 10.49 nm	④ 21.63 nm	⑤ 30.58 nm	
	⑥ 40.45 nm	⑦ 48.90 nm	⑧ 101.42 nm	⑨ 198.34 nm	⑩ 494.5 nm	
Uncertainty	① 0.59 nm	② 0.66 nm	③ 0.65 nm	④ 0.5 nm	⑤ 0.39 nm	
	⑥ 0.35 nm	⑦ 0.33 nm	⑧ 0.31 nm	⑨ 0.59 nm	⑩ 1.3 nm	
	(Confidence level 95 %, $k = 2$)					
Usage standard	KRISS R-207-016 (2021)					



254 (200 mm wafer dia) Certified reference material for the thickness of a thin film layer of silicon dioxide grown on silicon (10 types)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual order CRM/RM CRM

Unit of issue	Diameter of wafer : 200 mm					
Certified value or range	① 3.10 nm	② 5.09 nm	③ 10.52 nm	④ 21.58 nm	⑤ 30.53 nm	
	⑥ 40.41 nm	⑦ 48.94 nm	⑧ 101.48 nm	⑨ 198.41 nm	⑩ 495.0 nm	
Uncertainty	① 0.61 nm	② 0.66 nm	③ 0.65 nm	④ 0.5 nm	⑤ 0.39 nm	
	⑥ 0.35 nm	⑦ 0.33 nm	⑧ 0.31 nm	⑨ 0.59 nm	⑩ 1.3 nm	
	(Confidence level 95 %, $k = 2$)					
Usage standard	KRISS R-207-016 (2021)					



255 High purity silica (Powder type)

Category 106. Inorganics, Rocks, Ores

Producer Research Institute of Industrial Science and Technology

Options Batch order CRM/RM CRM

Unit of issue	powder 100 g / bottle											
Certified value or range	① Al : (0.01 ~ 200) mg/kg	② Ti : (0.01 ~ 10) mg/kg	③ Fe : (0.01 ~ 10) mg/kg									
	④ Ca : (0.01 ~ 10) mg/kg	⑤ Mg : (0.01 ~ 10) mg/kg	⑥ Na : (0.01 ~ 10) mg/kg									
	⑦ K : (0.01 ~ 10) mg/kg	⑧ Cr : (0.01 ~ 10) mg/kg	⑨ B : (0.01 ~ 10) mg/kg									
	⑩ Cu : (0.01 ~ 10) mg/kg	⑪ Co : (0.01 ~ 10) mg/kg	⑫ Li : (0.01 ~ 10) mg/kg									
	⑬ Mn : (0.01 ~ 10) mg/kg	⑭ Ni : (0.01 ~ 10) mg/kg	⑮ P : (0.01 ~ 10) mg/kg									
	⑯ Zr : (0.01 ~ 10) mg/kg	⑰ Zn : (0.01 ~ 10) mg/kg										
Uncertainty	(100 ~ 5) % (Confidence level about 95 %, $k = 2$)											
Usage standard	KS E 3006:2013											



256 High purity silica (Disk type)

Category	106. Inorganics, Rocks, Ores
Producer	Research Institute of Industrial Science and Technology
Options	Batch order CRM/RM CRM

Unit of issue	disk 15 x 15 x 5T (mm)		
Certified value or range	① Al : (0.01 ~ 200) mg/kg ④ Ca : (0.01 ~ 10) mg/kg ⑦ K : (0.01 ~ 10) mg/kg ⑩ Cu : (0.01 ~ 10) mg/kg ⑬ Mn : (0.01 ~ 10) mg/kg ⑯ Zr : (0.01 ~ 10) mg/kg	② Ti : (0.01 ~ 10) mg/kg ⑤ Mg : (0.01 ~ 10) mg/kg ⑧ Cr : (0.01 ~ 10) mg/kg ⑪ Co : (0.01 ~ 10) mg/kg ⑭ Ni : (0.01 ~ 10) mg/kg ⑰ Zn : (0.01 ~ 10) mg/kg	③ Fe : (0.01 ~ 10) mg/kg ⑥ Na : (0.01 ~ 10) mg/kg ⑨ B : (0.01 ~ 10) mg/kg ⑫ Li : (0.01 ~ 10) mg/kg ⑮ P : (0.01 ~ 10) mg/kg

Uncertainty (100 ~ 5) % (Confidence level about 95 %, $k = 2$)

Usage standard KS E 3006:2013



257 AlN thin film for thickness measurement (TEM) (2 types)

Category	207. Metrology
Producer	Korea Institute of Ceramic Engineering and Technology
Options	Batch order CRM/RM RM

Unit of issue	(10 mm x 10 mm) / ea
Certified value or range	① (9.00 ~ 11.00) nm ② (90.00 ~ 110.00) nm
Uncertainty	10 % (Confidence level about 95 %, $k = 2$)
Usage standard	ISO 20263:2017



258 GaN thin film for thickness measurement (TEM) (2 types)

Category	207. Metrology
Producer	Korea Institute of Ceramic Engineering and Technology
Options	Batch order CRM/RM RM

Unit of issue	(10 mm x 10 mm) / ea
Certified value or range	① (9.00 ~ 11.00) nm ② (90.00 ~ 110.00) nm
Uncertainty	10 % (Confidence level about 95 %, $k = 2$)
Usage standard	ISO 20263:2017



259 Barium titanate for chemical composition (ICP-OES)

Category	106. Inorganics, Rocks, Ores
Producer	Korea Institute of Ceramic Engineering and Technology
Options	Batch order CRM/RM RM

Unit of issue	powder 50 g / bottle
Certified value or range	① Ba : (55.00 ~ 61.00) wt % ② Ti : (19.00 ~ 22.00) wt % ③ Sr : (0.040 ~ 0.060) wt %
Uncertainty	10 % (Confidence level about 95 %, $k = 2$)
Usage standard	KS L 9300(2017)



260 Titanium dioxide for chemical composition (ICP-OES)

Category 106. Inorganics, Rocks, Ores
Producer Korea Institute of Ceramic Engineering and Technology
Options Batch order **CRM/RM** CRM

Unit of issue powder 30 g / bottle
Certified value or range Ti : (57.5 ~ 62.5) wt %
Uncertainty 10 % (Confidence level about 95 %, $k = 2$)
Usage standard KICET-QI -10609-01 (2020)



261 Zirconia reference material for chemical analysis

Category 106. Inorganics, Rocks, Ores
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** RM

Unit of issue powder 50 g / bottle
Certified value or range ① Al : (900 ~ 1 500) mg/kg
 ② Ti : (30 ~ 70) mg/kg
 ③ Hf : (10 000 ~ 20 000) mg/kg
 ④ Y : (30 000 ~ 50 000) mg/kg

Uncertainty ① Al : 20 %
 ② Ti : 20 %
 ③ Hf : 10 %
 ④ Y : 10 %
 (Confidence level about 95 %, $k = 2$)

Usage standard BS EN 725-12:2001



262 Zirconia reference material for chemical analysis

Category 106. Inorganics, Rocks, Ores
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** RM

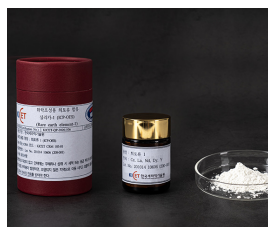
Unit of issue powder 50 g / bottle
Certified value or range ① Ti : (20 ~ 60) mg/kg
 ② Hf : (10 000 ~ 20 000) mg/kg
 ③ Y : (90 000 ~ 110 000) mg/kg
Uncertainty ① Ti : 20 %
 ② Hf : 10 %
 ③ Y : 10 %
 (Confidence level about 95 %, $k = 2$)
Usage standard BS EN 725-12:2001



263 Yttrium oxide reference material for chemical analysis

Category 106. Inorganics, Rocks, Ores
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** RM

Unit of issue powder 50 g / bottle
Certified value or range ① Al : (5 ~ 30) mg/kg
 ② Fe : (1 ~ 20) mg/kg
Uncertainty 20 % (Confidence level about 95 %, $k = 2$)
Usage standard KTL L 137-2020A



264 Silica 1 with rare earth for chemical composition (ICP-OES)

Category 106. Inorganics, Rocks, Ores
Producer Korea Institute of Ceramic Engineering and Technology
Options Batch order CRM/RM RM

Unit of issue powder 30 g / bottle

Certified value or range

- ① Ce : (3.94 ~ 4.65) wt %
- ② La : (1.79 ~ 2.17) wt %
- ③ Nd : (0.67 ~ 0.84) wt %
- ④ Dy : (0.36 ~ 0.50) wt %
- ⑤ Y : (0.67 ~ 0.88) wt %

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard KICET-QI-10606-01(2020)



266 Silica 3 with rare earth for chemical composition (ICP-OES)

Category 106. Inorganics, Rocks, Ores
Producer Korea Institute of Ceramic Engineering and Technology
Options Batch order CRM/RM RM

Unit of issue powder 30 g / bottle

Certified value or range

- ① Ce : (8.91 ~ 9.71) wt %
- ② La : (3.92 ~ 4.34) wt %
- ③ Nd : (1.41 ~ 1.70) wt %
- ④ Dy : (0.83 ~ 0.98) wt %
- ⑤ Y : (1.36 ~ 1.79) wt %

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard KICET-QI-10606-01(2020)



265 Silica 2 with rare earth for chemical composition (ICP-OES)

Category 106. Inorganics, Rocks, Ores
Producer Korea Institute of Ceramic Engineering and Technology
Options Batch order CRM/RM RM

Unit of issue powder 30 g / bottle

Certified value or range

- ① Ce : (6.28 ~ 7.35) wt %
- ② La : (2.83 ~ 3.29) wt %
- ③ Nd : (1.11 ~ 1.35) wt %
- ④ Dy : (0.61 ~ 0.76) wt %
- ⑤ Y : (1.00 ~ 1.35) wt %

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard KICET-QI-10606-01(2020)



267 Silica 4 with rare earth for chemical composition (ICP-OES)

Category 106. Inorganics, Rocks, Ores
Producer Korea Institute of Ceramic Engineering and Technology
Options Batch order CRM/RM RM

Unit of issue powder 30 g / bottle

Certified value or range

- ① Ce : (11.7 ~ 13.6) wt %
- ② La : (5.13 ~ 6.46) wt %
- ③ Nd : (1.98 ~ 2.46) wt %
- ④ Dy : (1.18 ~ 1.42) wt %
- ⑤ Y : (1.98 ~ 2.53) wt %

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard KICET-QI-10606-01(2020)



268 Surface Orientation CRM of Single Crystal Si Wafer

Category 209. X-ray Spectrometry

Producer Korea Research Institute of Standards and Science

Options Batch order **CRM/RM** CRM

Unit of issue single Crystal Si wafer-falt or notch type

Certified value or range
① Surface Orientation : $0^{\circ} \sim 2^{\circ}$
② Surface Orientation : $2^{\circ} \sim 4^{\circ}$

Uncertainty 0.005° (Confidence level 95 %, $k = 2$)

Usage standard R-207-013



269 Hydroxyapatite for chemical composition (ICP-OES)

Category 106. Inorganics, Rocks, Ores

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order **CRM/RM** CRM

Unit of issue powder 3 g / bottle

Certified value or range
① Ca : (36.00 ~ 43.00) wt %
② P : (17.00 ~ 23.00) wt %

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard KICET-QI-10609-01(2020)



270 Tricalcium phosphate for chemical composition (ICP-OES)

Category 106. Inorganics, Rocks, Ores

Producer Korea Institute of Ceramic Engineering and Technology

Options Batch order **CRM/RM** CRM

Unit of issue powder 5 g / bottle

Certified value or range
① Ca : (36.00 ~ 43.00) wt %
② P : (17.00 ~ 23.00) wt %

Uncertainty 10 % (Confidence level about 95 %, $k = 2$)

Usage standard KICET-QI-10609-01(2020)



271 $\text{Hf}_{0.5}\text{Zr}_{0.5}\text{O}_2$ thin film CRM (6 types)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Batch order **CRM/RM** CRM

Unit of issue 10 mm x 10 mm x 0.6 mm chip

Certified value or range
① 1.55 nm ② 2.01 nm ③ 2.47 nm
④ 2.96 nm ⑤ 3.40 nm ⑥ 3.93 nm

Uncertainty
① 0.11 nm (Confidence level 95 %, $k = 2.01$) ② 0.16 nm (Confidence level 95 %, $k = 2.01$)
③ 0.24 nm (Confidence level 95 %, $k = 2.01$) ④ 0.3 nm (Confidence level 95 %, $k = 2.02$)
⑤ 0.34 nm (Confidence level 95 %, $k = 2.03$) ⑥ 0.26 nm (Confidence level 95 %, $k = 2.01$)

Usage standard CCQM-P190



272 $\text{Hf}_{0.6}\text{Zr}_{0.4}\text{O}_2$ thin film CRM

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Batch order CRM/RM CRM

Unit of issue 10 mm x 10 mm x 0.6 mm chip

Certified value or range 1.39 nm

Uncertainty 0.16 nm (Confidence level 95 %, $k = 2.26$)

Usage standard CCQM-P190



273 $\text{Hf}_{0.7}\text{Zr}_{0.3}\text{O}_2$ thin film CRM

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Batch order CRM/RM CRM

Unit of issue 10 mm x 10 mm x 0.6 mm chip

Certified value or range 1.94 nm

Uncertainty 0.23 nm (Confidence level 95 %, $k = 2.36$)

Usage standard CCQM-P190



274 $\text{Hf}_{0.8}\text{Zr}_{0.2}\text{O}_2$ thin film CRM (4 types)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Batch order CRM/RM CRM

Unit of issue 10 mm x 10 mm x 0.6 mm chip

Certified value or range
① 2.48 nm
② 3.15 nm
③ 3.83 nm
④ 4.38 nm

Uncertainty
① 0.32 nm (Confidence level 95 %, $k = 2.45$)
② 0.27 nm (Confidence level 95 %, $k = 2.26$)
③ 0.45 nm (Confidence level 95 %, $k = 2.45$)
④ 0.33 nm (Confidence level 95 %, $k = 2.26$)

Usage standard CCQM-P190



275 Thermal diffusivity CRM made of silicon carbide (3 types)

Category 203. Thermodynamic Properties

Producer Korea Research Institute of Standards and Science

Options Batch order CRM/RM CRM

Unit of issue Diameter 10.0 mm, thickness 2.0 mm

Certified value or range
① (25 °C) Thermal diffusivity : $(4.34 \times 10^{-5}) \text{ m}^2/\text{s}$
② (200 °C) Thermal diffusivity : $(2.69 \times 10^{-5}) \text{ m}^2/\text{s}$
③ (400 °C) Thermal diffusivity : $(2.00 \times 10^{-5}) \text{ m}^2/\text{s}$

Uncertainty
① 25 °C : $(0.19 \times 10^{-5}) \text{ m}^2/\text{s}$ (Confidence level about 95 %, $k = 2$)
② 200 °C : $(0.12 \times 10^{-5}) \text{ m}^2/\text{s}$ (Confidence level about 95 %, $k = 2$)
③ 400 °C : $(0.08 \times 10^{-5}) \text{ m}^2/\text{s}$ (Confidence level about 95 %, $k = 2$)

Usage standard KS L 1604:2017



276 Thermal diffusivity CRM made of polyvinyl chloride sheet

Category 203. Thermodynamic Properties
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** CRM

Unit of issue Diameter 10.0 mm, thickness 0.6 mm

Certified value or range (25 °C) Thermal diffusivity : $(1.22 \times 10^{-7}) \text{ m}^2/\text{s}$

Uncertainty $(0.10 \times 10^{-7}) \text{ m}^2/\text{s}$ (Confidence level about 95 %, $k = 2$)

Usage standard KS L 1604:2017



277 Thermal diffusivity CRM made of graphite composite

Category 203. Thermodynamic Properties
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** CRM

Unit of issue Diameter 10.0 mm, thickness 1.1 mm

Certified value or range (25 °C) Thermal diffusivity : $(5.0 \times 10^{-7}) \text{ m}^2/\text{s}$

Uncertainty $(0.41 \times 10^{-7}) \text{ m}^2/\text{s}$ (Confidence level about 95 %, $k = 2$)

Usage standard KS L 1604:2017



278 Thermal diffusivity CRM made of silicon carbide (3 types)

Category 203. Thermodynamic Properties
Producer Korea Research Institute of Standards and Science
Options Batch order **CRM/RM** CRM

Unit of issue Diameter 10.0 mm

Certified value or range
 ① (thickness 2.0 mm, 25 °C) Thermal diffusivity : $(4.34 \times 10^{-5}) \text{ m}^2/\text{s}$
 ② (thickness 1.5 mm, 25 °C) Thermal diffusivity : $(4.24 \times 10^{-5}) \text{ m}^2/\text{s}$
 ③ (thickness 2.5 mm, 25 °C) Thermal diffusivity : $(4.30 \times 10^{-5}) \text{ m}^2/\text{s}$

Uncertainty
 ① $(0.19 \times 10^{-5}) \text{ m}^2/\text{s}$ (Confidence level about 95 %, $k = 2$)
 ② $(0.23 \times 10^{-5}) \text{ m}^2/\text{s}$ (Confidence level about 95 %, $k = 2$)
 ③ $(0.24 \times 10^{-5}) \text{ m}^2/\text{s}$ (Confidence level about 95 %, $k = 2$)

Usage standard KS L 1604:2017



279 Ceramic/plastic certified reference material for Permittivity measurement (6 types)

Category 206. Electricity and Magnetic properties
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** CRM

Unit of issue Diameter (10 ~ 80) mm, thickness (0.1 ~ 10) mm

Certified value or range
 ① dielectric constant : (100 Hz ~ 10 MHz) 2 ~ 5, loss tangent : (100 Hz ~ 10 MHz) 0.000 01 ~ 0.005
 ② dielectric constant : (100 Hz ~ 10 MHz) 5 ~ 7, loss tangent : (100 Hz ~ 10 MHz) 0.000 01 ~ 0.005
 ③ dielectric constant : (100 Hz ~ 10 MHz) 7 ~ 11, loss tangent : (100 Hz ~ 10 MHz) 0.000 01 ~ 0.005
 ④ dielectric constant : (100 Hz ~ 10 MHz) 2 ~ 5, loss tangent : (100 Hz ~ 10 MHz) 0.000 01 ~ 0.005
 ⑤ dielectric constant : (100 Hz ~ 10 MHz) 5 ~ 7, loss tangent : (100 Hz ~ 10 MHz) 0.000 01 ~ 0.005
 ⑥ dielectric constant : (100 Hz ~ 10 MHz) 7 ~ 11, loss tangent : (100 Hz ~ 10 MHz) 0.000 01 ~ 0.005

Uncertainty
 ① dielectric constant : 1.10 % (relative value), loss tangent : 232×10^{-6} (absolute value)
 ② dielectric constant : 1.56 % (relative value), loss tangent : 160×10^{-6} (absolute value)
 ③ dielectric constant : 1.97 % (relative value), loss tangent : 378×10^{-6} (absolute value)
 ④ dielectric constant : 1.29 % (relative value), loss tangent : 154×10^{-6} (absolute value)
 ⑤ dielectric constant : 2.00 % (relative value), loss tangent : 158×10^{-6} (absolute value)
 ⑥ dielectric constant : 2.79 % (relative value), loss tangent : 163×10^{-6} (absolute value)
 (Confidence level about 95 %, $k = 2$)

Usage standard ASTM D150-18, BS 7663:1993

IX. Division of Machinery / Material / Energy

〈Reference Material Developed from 2020 to 2021〉





280 Charpy V-Notch Specimen (Indirect-Verification, 8-mm Striker) (3 types)

Category 306. mechanical properties
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue 6 ea / box

Certified value or range
 ① Charpy impact energy ≤ 30 J
 ② Charpy impact energy (110 ~ 200) J
 ③ Charpy impact energy ≥ 200 J

Uncertainty
 ① 5 % or less (Confidence level about 95 %, $k = 2$)
 ② 5 % or less (Confidence level about 95 %, $k = 2$)
 ③ Not Applicable

Usage standard KS B 0810 : 2003, ISO 148-1 : 2016, ASTM E23-18



281 Fe-Ni Alloy (Invar-36) reference material (4 types)

Category 101. Ferrous Metals
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue Chip type 100 g / bottle

Certified value or range
 ① C : (0.001 ~ 0.15) %
 ② Mn : (0.1 ~ 0.6) %
 ③ Ni : (34 ~ 38) %
 ④ Si : (0.01 ~ 0.1) %

Uncertainty
 ① C : 20 %
 ② Mn : 10 %
 ③ Ni : 5 %
 ④ Si : 20 %
 (Confidence level about 95 %, $k = 2$)

Usage standard KS D 1789



282 Fe-Ni Alloy (Invar-42) reference material (4 types)

Category 101. Ferrous Metals
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue Chip type 100 g / bottle

Certified value or range
 ① C : (0.000 1 ~ 0.05) %
 ② Mn : (0.001 ~ 0.05) %
 ③ Ni : (40 ~ 44) %
 ④ Si : < 0.000 5 %

Uncertainty
 ① C : 60 %
 ② Mn : 10 %
 ③ Ni : 5 %
 ④ Si : Not Applicable
 (Confidence level about 95 %, $k = 2$)

Usage standard KS D 1789



283 Fe-Ni Alloy (Super-Invar) reference material (4 types)

Category 101. Ferrous Metals
Producer Korea Testing & Research Institute
Options Batch order **CRM/RM** RM

Unit of issue Chip type 100 g / bottle

Certified value or range
 ① C : (0.001 ~ 0.1) %
 ② Co : (4 ~ 6) %
 ③ Mn : (0.1 ~ 0.5) %
 ④ Ni : (30 ~ 35) %

Uncertainty
 ① C : 20 %
 ② Co : 10 %
 ③ Mn : 20 %
 ④ Ni : 5 %
 (Confidence level about 95 %, $k = 2$)

Usage standard KS D 1789



284 Copper alloy reference material (Cu-Zn-Pb-Sn) (6 types)

Category 102. Non Ferrous Metals

Producer Korea Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue	Chip type 100 g / bottle		
Certified value or range	① Cu : (78.0 ~ 85.0) %	② Sn : (2.0 ~ 5.0) %	③ Zn : (7.0 ~ 12.0) %
	④ Pb : (2.0 ~ 7.0) %	⑤ Ni : (0.5 ~ 2.0) %	⑥ Fe : (0.0 ~ 0.5) %
Uncertainty	① Cu : 3 %	② Sn : 10 %	③ Zn : 10 %
	④ Pb : 10 %	⑤ Ni : 15 %	⑥ Fe : 20 %
	(Confidence level about 95 %, $k = 2$)		
Usage standard	① Cu : KS D 1893, KS D ISO 1554	② Sn : KS D 1894	③ Zn : KS D 1884
	④ Pb : KS D 1895	⑤ Ni : KS D 1897	⑥ Fe : KS D 1892



285 Copper alloy reference material (Cu-Sn-Zn) (6 types)

Category 102. Non Ferrous Metals

Producer Korea Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue	Chip type 100 g / bottle					
Certified value or range	① Cu : (86.0 ~ 90.0) %	② Sn : (8.0 ~ 12.0) %	③ Zn : (3.0 ~ 5.0) %			
	④ Pb : (0.5 ~ 2.0) %	⑤ Ni : (0.0 ~ 0.5) %	⑥ Fe : (0.0 ~ 0.3) %			
Uncertainty	① Cu : 3 %	② Sn : 10 %	③ Zn : 10 %			
	④ Pb : 20 %	⑤ Ni : 30 %	⑥ Fe : 30 %			
(Confidence level about 95 %, $k = 2$)						
Usage standard	① Cu : KS D 1893, KS D ISO 1554	② Sn : KS D 1894	③ Zn : KS D 1884			
	④ Pb : KS D 1895	⑤ Ni : KS D 1897	⑥ Fe : KS D 1892			



286 Copper alloy reference material (Cu-Sn-Zn-Pb) (6 types)

Category 102. Non Ferrous Metals

Producer Korea Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue	Chip type 100 g / bottle		
Certified value or range	① Cu : (82.0 ~ 88.0) %	② Sn : (3.0 ~ 6.0) %	③ Zn : (3.0 ~ 6.0) %
	④ Pb : (3.0 ~ 6.0) %	⑤ Ni : (0.5 ~ 2.0) %	⑥ Fe : (0.0 ~ 0.3) %
Uncertainty	① Cu : 3 %	② Sn : 10 %	③ Zn : 10 %
	④ Pb : 10 %	⑤ Ni : 10 %	⑥ Fe : 30 %
	(Confidence level about 95 %, $k = 2$)		
Usage standard	① Cu : KS D 1893, KS D ISO 1554	② Sn : KS D 1894	③ Zn : KS D 1884
	④ Pb : KS D 1895	⑤ Ni : KS D 1897	⑥ Fe : KS D 1892



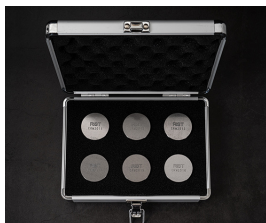
287 Copper alloy reference material (Cu-Fe-P) (4 types)

Category 102. Non Ferrous Metals

Producer Korea Testing & Research Institute

Options Batch order **CRM/RM** RM

Unit of issue	Chip type 100 g / bottle	
Certified value or range	① Cu : (96.5 ~ 98.0) %	② Zn : (0.05 ~ 0.20) %
	③ Fe : (2.1 ~ 2.6) %	④ P : (0.015 ~ 0.15) %
Uncertainty	① Cu : 3 %	② Zn : 30 %
	③ Fe : 15 %	④ P : 30 %
	(Confidence level about 95 %, $k = 2$)	
Usage standard	① Cu : KS D 1893, KS D ISO 1554	② Zn : KS D 1884
	③ Fe : KS D 1892	④ P : KS D 1888



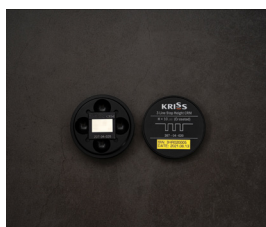
288 Carbon Steels

Category 101. Ferrous Metals

Producer Research Institute of Industrial Science and Technology

Options Batch order **CRM/RM** CRM

Unit of issue	6 ea (Cylinder, diameter 40 mm x height 25 mm)				
Certified value or range	① Al : (0.015 ~ 0.40) m/m % ② B : (0.001 ~ 0.02) m/m % ③ C : (0.10 ~ 1.4) m/m % ④ Cr : (0.10 ~ 8.0) m/m % ⑤ Cu : (0.005 ~ 1.0) m/m % ⑥ Mn : (0.20 ~ 4.0) m/m % ⑦ Mo : (0.001 ~ 2.0) m/m % ⑧ Ni : (0.01 ~ 4.0) m/m % ⑨ Nb : (0.005 ~ 0.40) m/m % ⑩ P : (0.004 ~ 0.14) m/m % ⑪ Si : (0.10 ~ 4.0) m/m % ⑫ S : (0.005 ~ 0.10) m/m % ⑬ Ti : (0.01 ~ 0.40) m/m % ⑭ W : (0.002 ~ 1.0) m/m % ⑮ V : (0.01 ~ 1.0) m/m %				
Uncertainty	① Al : (30 ~ 20) % ② B : (30 ~ 20) % ③ C : (20 ~ 10) % ④ Cr : (20 ~ 10) % ⑤ Cu : (30 ~ 10) % ⑥ Mn : (20 ~ 10) % ⑦ Mo : (100 ~ 40) % ⑧ Ni : (20 ~ 10) % ⑨ Nb : (30 ~ 20) % ⑩ P : (30 ~ 20) % ⑪ Si : (20 ~ 10) % ⑫ S : (30 ~ 20) % ⑬ Ti : (30 ~ 20) % ⑭ W : (30 ~ 10) % ⑮ V : (20 ~ 10) % (Confidence level about 95 %, $k = 2$)				
Usage standard	KS D 1652 : 2007				



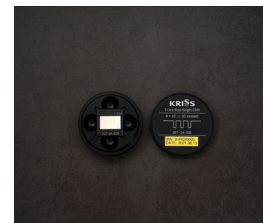
289 3 Line Step Height (Crystal) (4 types)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual order **CRM/RM** CRM

Unit of issue	Specimen : 12 mm x 12 mm, Silicon wafer				
Certified value or range	① 2 μm ② 3 μm ③ 6 μm ④ 10 μm				
Uncertainty	① 0.012 μm (Confidence level 95 %, $k = 2$) ② 0.014 μm (Confidence level 95 %, $k = 2$) ③ 0.022 μm (Confidence level 95 %, $k = 2$) ④ 0.022 μm (Confidence level 95 %, $k = 2$)				
Usage standard	ISO 5436-1				



290 3 Line Step Height (Metal) (4 types)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual order **CRM/RM** CRM

Unit of issue	Specimen : 12 mm x 12 mm, Chrome coated silicon wafer				
Certified value or range	① 2 μm ② 3 μm ③ 6 μm ④ 10 μm				
Uncertainty	① 0.012 μm (Confidence level 95 %, $k = 2$) ② 0.014 μm (Confidence level 95 %, $k = 2$) ③ 0.022 μm (Confidence level 95 %, $k = 2$) ④ 0.022 μm (Confidence level 95 %, $k = 2$)				
Usage standard	ISO 5436-1				



291 Surface Roughness (Crystal) (4 types)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual order **CRM/RM** CRM

Unit of issue	Specimen : 12 mm x 12 mm, Silicon wafer				
Certified value or range	① $R_a = 1 \mu\text{m}$, $R_z = 2 \mu\text{m}$ ② $R_a = 1.5 \mu\text{m}$, $R_z = 3 \mu\text{m}$ ③ $R_a = 3 \mu\text{m}$, $R_z = 6 \mu\text{m}$ ④ $R_a = 5 \mu\text{m}$, $R_z = 10 \mu\text{m}$				
Uncertainty	$R_a = 0.005 \mu\text{m}$, $R_z = 0.038 \mu\text{m}$ (Confidence level 95 %, $k = 2$)				
Usage standard	ISO 5436-1				



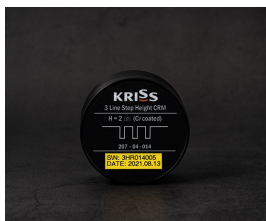
292 Surface Roughness (Metal) (4 types)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual order CRM/RM CRM

Unit of issue	Specimen : 12 mm x 12 mm, Chrome coated silicon wafer
Certified value or range	① Ra = 1 μ m, Rz = 2 μ m ② Ra = 1.5 μ m, Rz = 3 μ m ③ Ra = 3 μ m, Rz = 6 μ m ④ Ra = 5 μ m, Rz = 10 μ m
Uncertainty	Ra = 0.005 μ m, Rz = 0.038 μ m (Confidence level 95 %, $k = 2$)
Usage standard	ISO 5436-1



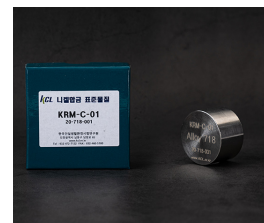
293 3 Line Step Height (2 types)

Category 207. Metrology

Producer Korea Research Institute of Standards and Science

Options Individual order CRM/RM CRM

Unit of issue	100 nm, Si wafer
Certified value or range	① 101.365 nm ② 102.310 nm
Uncertainty	① 1.836 nm (Confidence level 95 %, $k = 2$) ② 2.070 nm (Confidence level 95 %, $k = 2$)
Usage standard	ISO 5436-1



294 Nickel Alloy Alloy 718

Category 102. Non Ferrous Metals

Producer Korea Conformity Laboratory

Options Batch order CRM/RM RM

Unit of issue	DISK / ϕ 40 x t25
Certified value or range	① Cr : (17.0 ~ 21.0) % ② Fe : (18.00 ~ 21.00) % ③ Mo : (2.80 ~ 3.30) % ④ Nb : (4.75 ~ 5.50) % ⑤ Ni : (50.0 ~ 55.0) %
Uncertainty	Not Applicable
Usage standard	ASTM E 3047-16



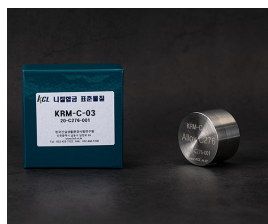
295 Nickel Alloy Alloy 625

Category 102. Non Ferrous Metals

Producer Korea Conformity Laboratory

Options Batch order CRM/RM RM

Unit of issue	DISK / ϕ 40 x t25
Certified value or range	① Cr : (20.0 ~ 23.0) % ② Fe : max. 5.00 % ③ Mo : (8.00 ~ 10.00) % ④ Nb : (3.15 ~ 4.15) % ⑤ Ni : min. 58.00 %
Uncertainty	Not Applicable
Usage standard	ASTM E 3047-16



296 Nickel Alloy Alloy C276

Category 102. Non Ferrous Metals

Producer Korea Conformity Laboratory

Options Batch order **CRM/RM** RM

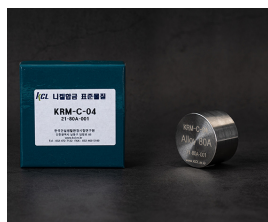
Unit of issue DISK / ø40 x t25

Certified value or range

- ① Cr : (14.5 ~ 16.5) %
- ② Fe : (4.0 ~ 7.0) %
- ③ Mo : (15.0 ~ 17.0) %
- ④ W : (3.0 ~ 4.5) %
- ⑤ Ni : (56.0 ~ 62.0) %

Uncertainty Not Applicable

Usage standard ASTM E 3047-16



297 Nickel Alloy Alloy 80A

Category 102. Non Ferrous Metals

Producer Korea Conformity Laboratory

Options Batch order **CRM/RM** RM

Unit of issue DISK / ø40 x t25

Certified value or range

- ① Cr : (18.00 ~ 21.00) %
- ② Ti : (1.80 ~ 2.70) %
- ③ Si : max. 1.00 %
- ④ Al : (0.50 ~ 1.80) %
- ⑤ Ni : (68.5 ~ 77.5) %

Uncertainty Not Applicable

Usage standard ASTM E 3047-16



298 Nickel Alloy Alloy 825

Category 102. Non Ferrous Metals

Producer Korea Conformity Laboratory

Options Batch order **CRM/RM** RM

Unit of issue DISK / ø40 x t25

Certified value or range

- ① Cr : (19.5 ~ 23.5) %
- ② Fe : (30.00 ~ 34.00) %
- ③ Mo : (2.5 ~ 3.5) %
- ④ Cu : (1.5 ~ 3.0) %
- ⑤ Ni : (38.0 ~ 46.0) %

Uncertainty Not Applicable

Usage standard ASTM E 3047-16



299 Nickel Alloy Nitinol

Category 102. Non Ferrous Metals

Producer Korea Conformity Laboratory

Options Batch order **CRM/RM** RM

Unit of issue DISK / ø30 x t12

Certified value or range

- ① Ni : (54.5 ~ 57.0) %
- ② Ti : (43.0 ~ 45.5) %

Uncertainty Not Applicable

Usage standard ASTM E 2594-20



300 Titanium alloy standard (ASTM Gr.1)

Category 102. Non Ferrous Metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	Cylinder, diameter 40 mm X height 25 mm
Certified value or range	① C : 0.002 7 m/m % ② Ni : 0.001 1 m/m %
Uncertainty	① C : 26 % (Confidence level 95 %, $k = 2.4$) ② Ni : 19 % (Confidence level 95 %, $k = 2.4$)
Usage standard	ASTM E2371-13, KS D 2529 : 2016



301 Titanium alloy standard (ASTM Gr.2)

Category 102. Non Ferrous Metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	Cylinder, diameter 40 mm X height 25 mm
Certified value or range	① Al : 0.016 m/m % ② C : 0.006 m/m % ③ Ni : 0.001 6 m/m %
Uncertainty	① Al : 36 % (Confidence level 95 %, $k = 2.1$) ② C : 31 % (Confidence level 95 %, $k = 2.2$) ③ Ni : 25 % (Confidence level 95 %, $k = 2.3$)
Usage standard	ASTM E2371-13, KS D 2529 : 2016



302 Titanium alloy standard (ASTM Gr.4)

Category 102. Non Ferrous Metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	Cylinder, diameter 40 mm X height 25 mm
Certified value or range	① Al : 0.005 m/m % ② C : 0.003 8 m/m % ③ Cr : 0.037 m/m % ④ Fe : 0.20 m/m % ⑤ Mn : 0.002 7 m/m % ⑥ Ni : 0.031 m/m %
Uncertainty	① Al : 43 % (Confidence level 95 %, $k = 2.1$) ② C : 21 % (Confidence level 95 %, $k = 2.2$) ③ Cr : 11 % (Confidence level 95 %, $k = 2.3$) ④ Fe : 10 % (Confidence level 95 %, $k = 2.4$) ⑤ Mn : 15 % (Confidence level 95 %, $k = 2.3$) ⑥ Ni : 6 % (Confidence level 95 %, $k = 2.3$)
Usage standard	ASTM E2371-13, KS D 2529 : 2016



303 Titanium alloy standard (ASTM Gr.5)

Category 102. Non Ferrous Metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	Cylinder, diameter 40 mm X height 25 mm
Certified value or range	① Al : 6.2 m/m % ② Cr : 0.006 m/m % ③ Fe : 0.15 m/m % ④ Ni : 0.015 m/m % ⑤ Sn : 0.008 m/m % ⑥ V : 4.26 m/m %
Uncertainty	① Al : 3 % (Confidence level 95 %, $k = 2.1$) ② Cr : 48 % (Confidence level 95 %, $k = 2.6$) ③ Fe : 7 % (Confidence level 95 %, $k = 2.4$) ④ Ni : 13 % (Confidence level 95 %, $k = 2.4$) ⑤ Sn : 24 % (Confidence level 95 %, $k = 2.6$) ⑥ V : 2 % (Confidence level 95 %, $k = 2.2$)
Usage standard	ASTM E2371-13



304 Titanium alloy standard (ASTM Gr.12)

Category 102. Non Ferrous Metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	Cylinder, diameter 40 mm X height 25 mm		
Certified value or range	① Al : 0.026 m/m % ④ Cu : 0.001 7 m/m % ⑦ Ni : 0.81 m/m %	② C : 0.007 m/m % ⑤ Fe : 0.25 m/m % ⑧ V : 0.010 m/m %	③ Cr : 0.042 m/m % ⑥ Mo : 0.28 m/m %
Uncertainty	① Al : 31 % (Confidence level 95 %, $k = 2.1$) ② C : 30 % (Confidence level 95 %, $k = 2.4$) ③ Cr : 5 % (Confidence level 95 %, $k = 2.1$) ④ Cu : 29 % (Confidence level 95 %, $k = 2.6$) ⑤ Fe : 12 % (Confidence level 95 %, $k = 2.4$) ⑥ Mo : 7 % (Confidence level 95 %, $k = 2.3$) ⑦ Ni : 7 % (Confidence level 95 %, $k = 2.4$) ⑧ V : 29 % (Confidence level 95 %, $k = 2.1$)		
Usage standard	ASTM E2371-13, KS D 2529 : 2016		



305 Titanium alloy standard (Ti-62222)

Category 102. Non Ferrous Metals
Producer Research Institute of Industrial Science and Technology
Options Batch order **CRM/RM** CRM

Unit of issue	Cylinder, diameter 40 mm X height 25 mm		
Certified value or range	① Al : 6.0 m/m % ④ Fe : 0.029 m/m % ⑦ Zr : 2.2 m/m %	② C : 0.007 m/m % ⑤ Mo : 2.0 m/m %	③ Cr : 1.8 m/m % ⑥ Sn : 1.9 m/m %
Uncertainty	① Al : 7 % (Confidence level 95 %, $k = 2.1$) ② C : 30 % (Confidence level 95 %, $k = 2.4$) ③ Cr : 11 % (Confidence level 95 %, $k = 2.1$) ④ Fe : 21 % (Confidence level 95 %, $k = 2.1$) ⑤ Mo : 10 % (Confidence level 95 %, $k = 2.2$) ⑥ Sn : 10 % (Confidence level 95 %, $k = 2.1$) ⑦ Zr : 9 % (Confidence level 95 %, $k = 2.1$)		
Usage standard	ASTM E2371-13, KS D 2529 : 2016		



306 Polystyrene Sphere Latex (4 types)

Category 301. Sizing
Producer HCT co., Ltd.
Options Batch order **CRM/RM** CRM

Unit of issue	15 mL / bottle
Certified value or range	① (40 ~ 60) nm ② (80 ~ 120) nm ③ (180 ~ 220) nm ④ (800 ~ 1200) nm
Uncertainty	10 % Below (Confidence level about 95 %, $k = 2$)
Usage standard	ISO 15900:2020



307 Fine dust certified reference material for PAHs

Category 109. Environmental Pollutions
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** CRM

Unit of issue	powder 30 g / bottle
Certified value or range	① Phenanthrene : (100 ~ 5 000) mg/kg ② Benzo(b)Fluoranthene : (1.0 ~ 100) mg/kg
Uncertainty	60% (Confidence level about 95 %, $k = 2$)
Usage standard	NIER notice no. 2021-61 air pollution test standard -ES 01803.1: 2021



308 Fine dust certified reference material for heavy metal analysis

Category 109. Environmental Pollutions
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** CRM

Unit of issue	powder 50 g / bottle
Certified value or range	① Cr : (1.0 ~ 100) mg/kg ② Ni : (1.0 ~ 100) mg/kg ③ Cd : (10 ~ 500) mg/kg ④ Pb : (1.0 ~ 100) mg/kg
Uncertainty	60 % (Confidence level about 95 %, $k = 2$)
Usage standard	NIER notice no. 2021-61 air pollution test standard -ES 01803.1: 2021



309 Liquid certified reference material for density measurement (6 types)

Category 207. Metrology
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** CRM

Unit of issue	10 mL / bottle
Certified value or range	① 0.7 g/cm ³ ② 0.8 g/cm ³ ③ 1 g/cm ³ ④ 1.2 g/cm ³ ⑤ 1.3 g/cm ³ ⑥ 1.6 g/cm ³
Uncertainty	0.003 % (Confidence level about 95 %, $k = 2$)
Usage standard	KS M ISO 12185:1996



310 Water certified reference material for sugar content measurement (7 types)

Category 207. Metrology
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** CRM

Unit of issue	10 mL / bottle
Certified value or range	① 10 % ② 12 % ③ 20 % ④ 30 % ⑤ 40 % ⑥ 50 % ⑦ 60 %
Uncertainty	0.05 % (Confidence level about 95 %, $k = 2$)
Usage standard	KS M 0005:2017



311 Silicone certified reference material for viscosity measurement (10 types)

Category 207. Metrology
Producer Korea Testing Laboratory
Options Batch order **CRM/RM** CRM

Unit of issue	500 mL / bottle
Certified value or range	① kinematic viscosity : 2.0 mm ² /s, viscosity : 1.8 mPa·s (20 °C) ② kinematic viscosity : 10 mm ² /s, viscosity : 9 mPa·s (20 °C) ③ kinematic viscosity : 50 mm ² /s, viscosity : 48 mPa·s (20 °C) ④ kinematic viscosity : 100 mm ² /s, viscosity : 97 mPa·s (20 °C) ⑤ kinematic viscosity : 500 mm ² /s, viscosity : 490 mPa·s (20 °C) ⑥ kinematic viscosity : 1000 mm ² /s, viscosity : 970 mPa·s (20 °C) ⑦ kinematic viscosity : 5000 mm ² /s, viscosity : 4800 mPa·s (20 °C) ⑧ kinematic viscosity : 10 000 mm ² /s, viscosity : 9700 mPa·s (20 °C) ⑨ kinematic viscosity : 100 000 mm ² /s, viscosity : 97 000 mPa·s (20 °C) ⑩ kinematic viscosity : 300 000 mm ² /s, viscosity : 291 000 mPa·s (20 °C)
Uncertainty	1.0 % (Confidence level about 95 %, $k = 2$)
Usage standard	KS A 0531:2016



312 Silver nano-particle certified reference material for particle size analysis (3 types)

Category301. Sizing

ProducerKorea Testing Laboratory

OptionsBatch orderCRM/RMCRM

Unit of issue	5 mL / bottle
Certified value or range	① (15 ~ 25) nm ② (50 ~ 70) nm ③ (95 ~ 125) nm
Uncertainty	① 25 % (Confidence level about 95 %, $k = 2$) ② 10 % (Confidence level about 95 %, $k = 2$) ③ 10 % (Confidence level about 95 %, $k = 2$)
Usage standard	IEC 22412 : 2017

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