

TEST REPORT

 CTK Co., Ltd. The Power Leader of Global Regulatory Certification	CTK Co., Ltd. 5 Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Republic of Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Report No.: CTK-2023-01884 Page (1) / (29) pages	
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1. Applicant

◦ Name : Hanwha Vision Co., Ltd
◦ Address : 6 Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13488 KOREA
◦ Date of Receipt : 2023-07-31

2. Manufacturer

◦ Name : Hanwha Vision Co., Ltd
◦ Address : 6 Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13488 KOREA

3. Use of Report : Quality control

4. Test sample / Model : Network Camera / PNM-C16013RVQ

5. Date(s) of test : 2023-08-01 to 2023-08-08

6. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

Address: (5 Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Republic of Korea)

7. Test Standard (Method) used : NEMA 250-2014
Enclosures for Electrical Equipment (1000 Volts Maximum)

8. Testing Environment : Temperature: (25.0 ± 5.0) °C
Humidity: (40.0 ± 5.0) %.

9. Test Results : Refer to each test items

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This Test Report cannot be reproduced, except in full.

The test was conducted as one sample, and the test result does not depend on the number of samples

Affirmation	Tested by HyungUk Jeon  (Signature)	Technical Manager SooChan Bae  (Signature)
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2023-08-29

CTK Co., Ltd



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Test item description: NETWORK CAMERA Trade Mark:	
	
Manufacturer	6 Pangyo-ro 319Beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, 13488 KOREA
Model/Type reference	PNM-C16013RVQ
Ratings	Electrical PoE (53 V  23.5 W) / PoE (53 V  0.45 A) Dimension: Ø 200 mm by 628 mm, Ø 175 mm by 549.5 mm, Ø 145 mm by 455.3 mm, Ø 25 mm by 78.5 mm, Ø 6*2 mm by 37.68 mm, Ø 6.8*4 mm by 85.4 mm

List of Attachments (including a total number of pages in each attachment): Attachment 1: 11-13 pages (Construction Diagram including installation method) Attachment 2: 14-24 pages (Parts List) Attachment 3: 25-29 pages (photographs)	
Summary of testing:	
Tests performed (name of test and test clause): Clause 5.7(Hose Down Test)	Testing location: CTK Co., Ltd. 5 Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Republic of Korea

Copy of marking plate: The artwork above may be only a draft.	
제품명칭: NETWORK CAMERA 모델명: PNM-C16013RVQ 정격전압: PoE (53V ) 23.5W M/C: PNM-C16013RVQ/KDO Fac. ID: D  DATE S/N: Serial No. MAC ADDRESS: XX-XX-XX-XX-XX-XX 인증번호: R-R-StW-PNMC16013RVQ 상호: 한화비전(주) 제조자/제조국가:한화비전(주)/한국	       NETWORK CAMERA,PNM-C16013RVQ PoE(53V ) 0.45A M/C: PNM-C16013RVQ/KEX Fac.ID:D  DATE S/N: XXXXXXXXXXXXXXXX MAC ADDRESS: XX-XX-XX-XX-XX-XX CAN ICES-3(A)/NMB-3(A) HANWHA VISION CO.,LTD. MADE IN KOREA 

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Test item particulars.....: Network Camera
Classification of installation and use Outdoor (Watertight/Corrosion Resistant)
Possible test case verdicts: - test case does not apply to the test object: N/A - test object does meet the requirement.....: P (Pass) - test object does not meet the requirement: F (Fail) - test case does not evaluated to the test object : N/E

General remarks: "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a ☐ comma / ☒ point is used as the decimal separator. Clause numbers between brackets refer to clauses in NEMA 250-2014
Name and address of factory (ies): 1. HANWHA VISION VIETNAM COMPANY LIMITED Lot O-2, Que Vo Industrial Zone extended area, Nam Son commune, Bac Ninh city, Bac Ninh province, Vietnam 2. D-TECH CO., LTD. 173-25, Saneop-ro, Gwonseon-gu, Suwon-si, Gyeonggi-do, Korea (Suwon Industrial Complex) Type 4X Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt and windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose directed water); that provides an increased level of protection against corrosion; and that will be undamaged by the external formation of ice on the enclosure.

Table 2-1
Comparison of Specific Applications of Enclosures for Indoor Nonhazardous (Unclassified) Locations

Provides a Degree of Protection against the Following Conditions	Type of Enclosure									
	1	2	4	4X	5	6	6P	12	12K	13
Access to hazardous parts	X	X	X	X	X	X	X	X	X	X
Ingress of solid foreign objects (falling dirt)	X	X	X	X	X	X	X	X	X	X
Ingress of water (dripping and light splashing)	...	X	X	X	X	X	X	X	X	X
Ingress of solid foreign objects (circulating dust, lint, fibers, and flyings **)	...	...	X	X	...	X	X	X	X	X
Ingress of solid foreign objects (settling airborne dust, lint, fibers, and flyings **)	...	...	X	X	X	X	X	X	X	X
Ingress of water (hosedown and splashing water)	...	...	X	X	...	X	X	...	...	...
Oil and coolant seepage	...	...	...	...	...	...	...	X	X	X
Oil or coolant spraying and splashing	...	...	...	...	...	...	...	...	...	X
Corrosive agents	...	...	...	X	...	...	X	...	...	...
Ingress of water (occasional temporary submersion)	...	...	...	...	...	X	X	...	...	...
Ingress of water (occasional prolonged submersion)	...	...	...	...	...	...	X	...	...	...

** These fibers and flyings are not considered Class III type ignitable fibers or combustible flyings. For Class III type ignitable fibers or flyings see the *National Electrical Code®*, Article 500.5(D).

Table 2-2
Comparison of Specific Applications of Enclosures for Indoor & Outdoor Nonhazardous (Unclassified) Locations

Provides a Degree of Protection Against the Following Conditions	Type of Enclosure									
	3	3X	3R	3RX	3S	3SX	4	4X	6	6P
Access to hazardous parts	X	X	X	X	X	X	X	X	X	X
Ingress of solid foreign objects (falling dirt)	X	X	X	X	X	X	X	X	X	X
Ingress of water (dripping and light splashing)	X	X	X	X	X	X	X	X	X	X
Ingress of water (rain, snow, and sleet **)	X	X	X	X	X	X	X	X	X	X
Sleet ***	...	...	...	...	X	X	...	...	...	...
Ingress of solid foreign objects (windblown dust, lint, fibers, and flyings****)	X	X	...	...	X	X	X	X	X	X
Ingress of water (hosedown and splashing water)	...	...	...	...	...	...	X	X	X	X
Corrosive agents	...	X	...	X	...	X	...	X	...	X
Ingress of water (occasional temporary submersion)	...	...	...	...	...	...	...	...	X	X
Ingress of water (occasional prolonged submersion)	...	...	...	...	...	...	...	...	...	X

** External operating mechanisms are not required to be operable when the enclosure is ice covered.

*** External operating mechanisms are operable when the enclosure is ice covered. See subsection 5.6.

**** These fibers and flyings are not considered Class III type ignitable fibers or combustible flyings. For Class III type ignitable fibers or flyings see the *National Electrical Code®*, Article 500.5(D).

Table 5-1A
Degrees of Protection Against Access to Hazardous Parts

Enclosure Type	Test Conditions	Degree of Protection		Corresponding IP First Characteristic Numeral
		Brief Description	Definition	
4X	5.7	Protected against access to hazardous parts with a wire	An access probe of 1.0 mm shall not penetrate	6

Table 5-1B
Degrees of Protection Against Solid Foreign Objects

Enclosure Type	Test Conditions	Degree of Protection		Corresponding IP First Characteristic Numeral
		Brief Description	Definition	
4X	<u>Non-vented</u> 5.7	Windblown dust protected	No ingress of dust	6
	<u>Vented</u> 5.5.1 Dust Blast Method			

Table 5-1C
Degrees of Protection against Water

Enclosure Type	Test Conditions	Degree of Protection		Corresponding IP Second Characteristic Numeral
		Brief Description	Definition	
4X	5.7	Protected against hose directed water	Water projected against the enclosure in any direction shall not enter	6 No Ingress Allowed*

Table 5-1D
Additional Protection

Enclosure Type	Test Conditions	Additional Protection		Corresponding IP Second Characteristic Numeral
		Brief Description	Definition	
4X	5.6 5.9 5.10	Special corrosion protection and undamaged by the external formation of ice	Enclosure provides increased corrosion protection and is not damaged by ice that forms on the outside	None

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NEMA 250-2014			
Clause	Requirement + Test	Result - Remark	Verdict

3	CONSTRUCTION		
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3.1	General		P
3.2	Units of Measurement		P
3.3	Materials-General	Enclosures are made of metal or polymeric materials	P
3.4	Materials-Polymeric	More than 650 mm ² (1 in ²) in area Polymeric Materials used is declared as Min. V-2 Used to UL certified material. (See the attachment 2)	N/E
3.5	Corrosion Protection	Stainless steel and/or aluminium are declared as the materials used (See the attachment 2)	N/E
3.6	Openings	No openings in Product	N/A
3.7	Mounting	Mounting means are external to the equipment cavity (See the attachment 1)	P
3.8	Conduit Connection	No conduit connection (See the attachment 1)	N/A
3.9	Hubs and Fittings	No Hubs and Fittings	N/A
3.10	Knockouts	No Knockouts	N/A
3.11	External Operating Mechanisms	No External Operating Mechanisms	N/A
3.12	Access to Interior	Needs tool to open unit	P
3.13	Closing Hardware	No closing Hardware	N/A
3.14	Gaskets	Gaskets made of a silicone Sponge Rubber (no Elastomeric or Thermoplastic used) (See clause 5.14 and the attachment 2)	P
3.15	Observation Windows	No Observation Window	N/A

4	MARKING		
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NEMA 250-2014			
Clause	Requirement + Test	Result - Remark	Verdict
4.1	Type Designations	"Type 4X" Marking is declared to be on the product before on the market	P
4.2	Supplemental Markings	Supplemental Marking (watertight/ corrosion resistant) is declared to be used when it is on the market. The required marking shall be added on the product)	P
4.3	Location of Markings	See the Attachment 3	P
4.4	Enclosure Orientation	No Particular Mounting Orientation	N/A
4.5	Conduit Hubs and Closure Plates	No Conduit Hubs and Closure Plates	N/A
4.6	Equipment Openings	No Openings on Unit	N/A
4.7	Drainage Openings	No Drain Openings	N/A

5	DESIGN TESTS	
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5.1	General	See Table 5-1A to 5-1D and 5.1.5 in the General product information	P
5.2	Tests For Protection Against Access to Hazardous Parts	Rated 4X	N/A
5.3	Tests for Protection Against Ingress of Water (Dripping and Light Splashing)	Rated 4X	N/A
5.4	Tests for Protection Against Ingress of Water (Rain)	Rated 4X	N/A
5.5	Tests for Protection Against Ingress of Solid Foreign Objects (Setting Airborne Dust, Lint, Fibers, And Flings)	Non-vented (See clause 5.7)	N/A
5.6	External Icing Test	No external cavities to trap water when mounted in the normal position.	N/A
5.7	Tests for Protection Against Ingress of Water (Hosedown)	No entry of water See the test information	P
5.8	Indoor Corrosion Protection (Rust-Resistance Test (24-Hour Salt Spray Test))	See clause 3.5	N/E
5.9	Outdoor Corrosion Protection	See clause 3.5	N/E
5.10	Corrosion Protection-Type 3X, 3RX, 3SX, 4X Or 6P Enclosures	See clause 3.5	N/E

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NEMA 250-2014			
Clause	Requirement + Test	Result - Remark	Verdict
5.11	Test for Protection Against Ingress of Water (Temporary Submersion)	Rated 4X	N/A
5.12	Test for Protection Against Ingress of Water (Prolonged Submersion)	Rated 4X	N/A
5.13	Oil Exclusion Test	Rated 4X	N/A
5.14	GASKET MATERIAL TESTS	The product itself(including gaskets) was conditioned at 70 °C for 168 hrs according to 5.14.3(Alternate Evaluation) before performing relevant required tests.	P
5.15	Test for Sharpness of Edges	No sharp edges	P

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NEMA 250-2014			
Clause	Requirement + Test	Result - Remark	Verdict

Test Information

	Hose Down Test: Clause 5.7	P
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Description of Test

The enclosure and its external mechanisms were subjected to a stream of water from a hose that has a 25.4 mm (1 in) inside diameter nozzle and delivers at least 240 L (65 gal) per minute.

The nozzle was held from 3.0 to 3.5 m (10 to 12 feet) from the enclosure, and the spray of water was directed at all points of potential water entry such as seams, joints, external operating mechanisms, and such. The nozzle was moved along each test point one time at a uniform rate of 6 mm/sec(1/4 in/sec).

Sample Dimension

Ø 200 mm by 628 mm, Ø 175 mm by 549.5 mm,

Ø 145 mm by 455.3 mm, Ø 25 mm by 78.5 mm,

Ø 6*2 mm by 37.68 mm, Ø 6.8*4 mm by 85.4 mm

Test Duration = 305.73 secs

Acceptance conditions:

The enclosure shall be considered to have met the requirements if at the conclusion of the test no water has entered the enclosure

Test Results

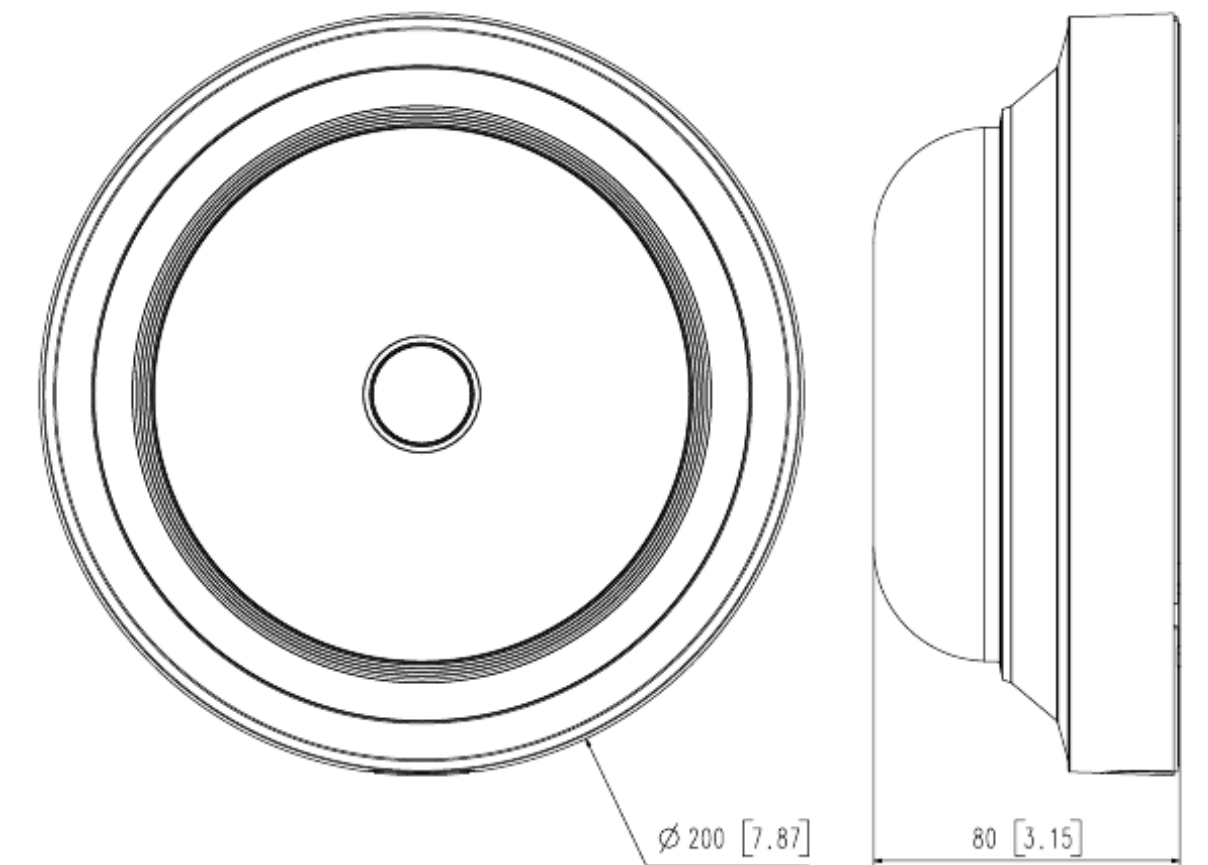
Sample No (Model)	Water Flow	Presence of water inside	Result
PNM-C16013RVQ	240 LPM	No	Pass

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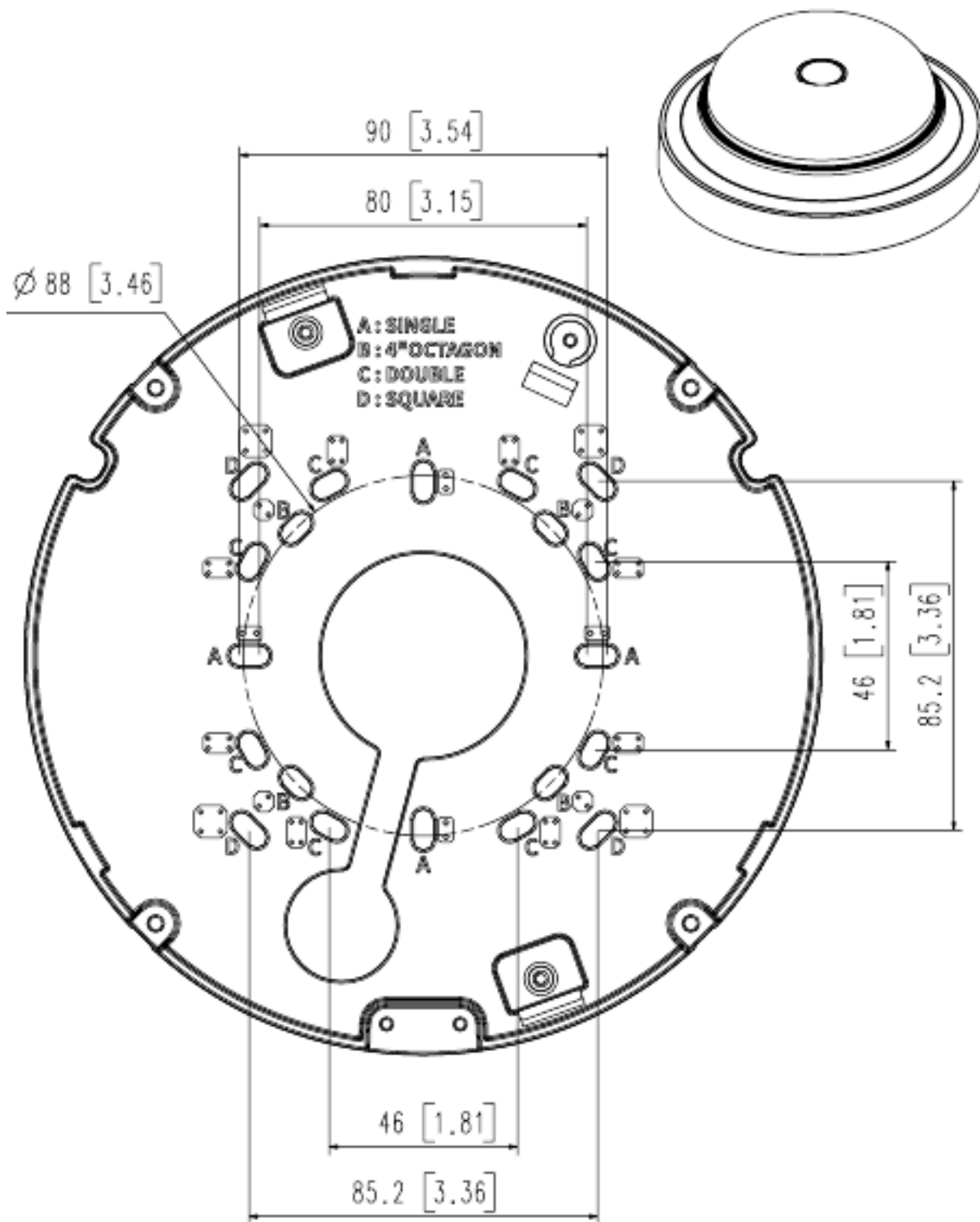
List of test equipment used:

Instr. Code	Instrument Type	Range Used	Mfr./Model	Calibration Date	
				Last	Due
S3-IP18	25.4mm Nozzle	25.4 mm	CTK/S3-IP18	-	Checked by calliper below before using
S1-SW2	Stop Watch	0.01 s	CASIO/ NONE	2022-02-22	2024-02-21
C-S1-D09	Steel Measuring Tape	5 m	KOMELON/KMC-74N	2023-02-17	2024-11-14
S3-IP23	Water flow meter	250LPM	Nuri tech/ Z-6504	2024-01-19	2024-02-12
C-S1-D02	DIGITAL VERNIER CALIPER	150 mm	MITUTOYO/150 mm	2023-07-31	2024-07-31

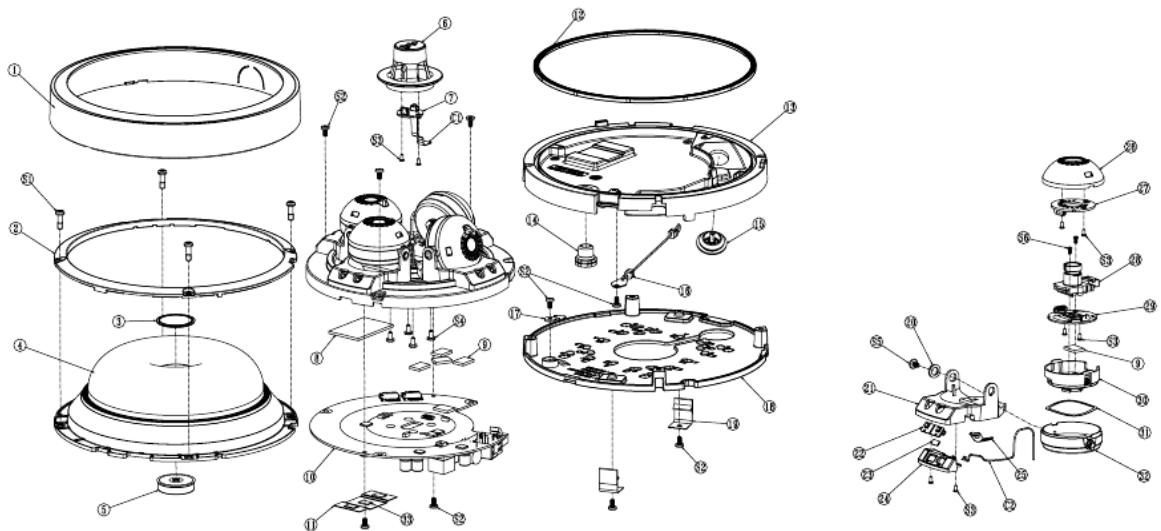
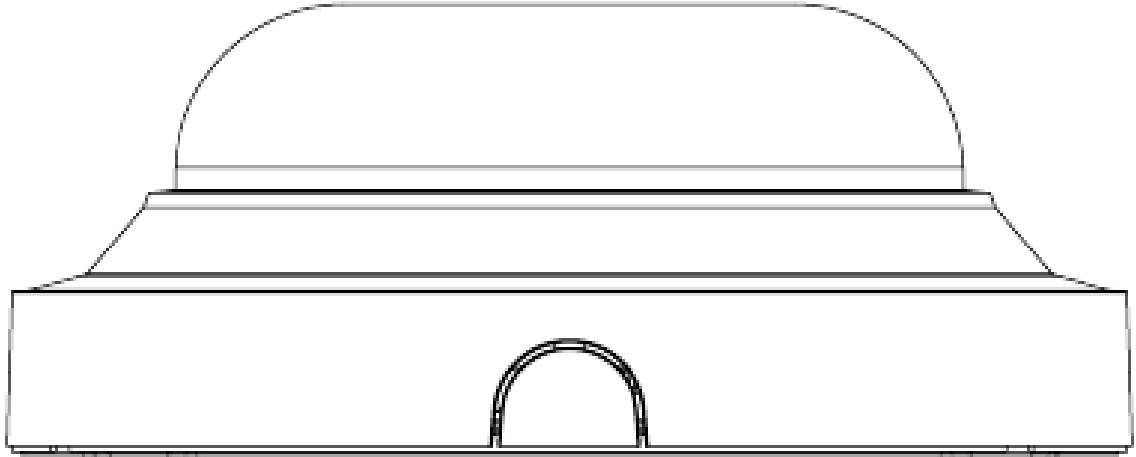
Attachment 1 – Construction Diagram and installation method



Attachment 1 – Construction Diagram and installation method



Attachment 1 – Construction Diagram and installation method



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Attachment 2 – Parts List

No.	Part No.	Part Name	Q'ty
1	FC29-015860A	CASE-TOP-PNM-C16013RVQ;PC	1
2	FC09-015883A	BRACKET-DOME-PNM-C16013RVQ;ADC12	1
3	FC15-009557A	COVER-DECO-PNM-C16013RVQ;PC	1
4	AM08-007170A	ASSY-COVER-GLASS-PNM-C16013RVQ	1
5	FC15-009558A	COVER-GHOST-PNM-C16013RVQ;PC	1
6	MC19-003783A	SHAFT-PAN-PNM-C16013RVQ;PC	1
7	AM06-011035A	ASSY,PCB-PNM-C16013RVQ USB	1
8	FC28-003047A	PAD-THERMAL-48X30XT1,K=7W/M-K	1
9	FC28-002489A	PAD-THERMAL_1014T2_V6430BNH	4
10	AM06-011039A	ASSY,PCB-PNM-C16013RVQ MAIN	
11	FC36-001484A	SHEET-MGC-D8008LI ESD ABSORBER;FA14STX,4	1
12	FC10-001259A	RUBBER-BOTTOM-PNM-C16013RVQ;SILICON	1
13	FC29-015861A	CASE-BOTTOM-PNM-C16013RVQ;ADC12	1
14	HP06-001187	VENT-GORE-PMF100585;MEMBRANE,SCREW IN,PM	1
15	MC06-001082A	BUSHING-CABLE FLEXIBLE;SILICON,GRAY	1
16	RM01-004164A	WIRE,METALIC-SAFETY_9080VQ;STS304	1
17	FC09-006670A	BRACKET-WIRE-SNO-8081R;SUS304,1.2	1
18	FC39-007276A	MOUNT-PLATE-PNM-C16013RVQ;ADC12	1
19	FC38-001334A	SPRING,ETC-FIXED-PNM-C16013RVQ;SUS CSP	2
20	FC10-001068A	RUBBER-TILT_9020;SILICON	4
21	FC39-007278A	FRAME-PAN-PNM-C16013RVQ;PC+GF	4
22	AM06-010735A	ASSY,PCB-XNV-9083RZ IR LED	4
23	FC28-002363A	PAD-THERMAL_W8_D4_T1	4
24	EP07-001895A	SINK,HEAT-LED-PNM-C16013RVQ;ADC12	4
25	FC30-008797A	PLATE-PAN-PNM-C16013RVQ;SUS CSP	4
26	FC15-009559A	COVER-FRONT-PNM-C16013RVQ;PC,CH1	1
	FC15-009559B	COVER-FRONT-PNM-C16013RVQ;PC,CH2	1
	FC15-009559C	COVER-FRONT-PNM-C16013RVQ;PC,CH3	1
	FC15-009559D	COVER-FRONT-PNM-C16013RVQ;PC,CH4	1



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Report No.:
CTK-2023-01884
Page (15) / (29) pages

Attachment 2 – Parts List

No.	Part No.	Part Name	Q'ty	Note
S1	FC18-004000A	SCREW-BUILT-IN_TORX20;0.7,15,NO,4	4	외관
S2	Z6001049601A	SCREW-MACHINE;6001-000128,BH,+,M3,L6,NI	9	SPRING (2) SAFETY-WIRE (2) PCB-MAIN (5)
S3	Z6003019801A	SCREW-TAPTITE:PL,+,M2,L4,WHT,B-TYPE	26	PCB-HEATER (2) LENS (2) PCB-LED (2) x 4, PCB-USB (2)
S4	Z6003013801A	SCREW-TAPTITE:BH,+,M3,L8,BLK,B-TYPE	4	SHAFT-PAN (4)
S5	Z6009001301A	SCREW-TAPTITE:PW,+,M3,L6,BLK,B-TYPE	4	TILT 축 (1 x 4)
S6	Z6001049001A	SCREW-MACHINE : CH,+,M2,L4,WHT,FP	8	PCB-SENSOR (2) x 4
No.	Part No.	Part Name	Q'ty	Note
C1	EP02-001213	CABLE-QRN-1610S;FFC,10P,-,100MM,0.5PITCH	1	IR ↔ MAIN
C2	EP02-005211A	HARNESS-PNM-C32083RVQ;HEATER_CDS,BLK,5-5	4	PCB-HEATER ~ PCB-SENSOR
C3	EP02-005274A	HARNESS-XNP-C9310R;MCX,30P-30P,110MM	1	PCB-SENSOR ~ PCB-MAIN
	EP02-005305A	HARNESS-PNM-C16013RVQ;MCX,30P-30P,110MM,	1	
	EP02-005306A	HARNESS-PNM-C16013RVQ;MCX,30P-30P,110MM,	1	
	EP02-004838A	HARNESS-TNM-3620TDY;MCX,30P-30P,110MM	1	
C4	EP02-005059A	HARNESS-PNM-A7083RVD IR LED;WIRE,RED,2P-	1	PCB-LED ~ PCB-MAIN
	EP02-005060A	HARNESS-PNM-A7083RVD IR LED;WIRE,GREEN,2	1	
	EP02-005061A	HARNESS-PNM-A7083RVD IR LED;WIRE,BLUE,2P	1	
	EP02-004636B	HARNESS-PNM-9084QZ HEATER;WIRE,BLACK,2P-	1	



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Report No.:
CTK-2023-01884
Page (16) / (29) pages

Attachment 2 – Parts List



Component - Plastics

File Number: E115797

LOTTE CHEMICAL CORPORATION
56 GOSAN-RO
UIWANG-SI, GYEONGGI-DO 16073 Republic of Korea



INFINO: HN-1068(+)(f1)

Polycarbonate (PC), pellets

(+) - May be replaced by one, two, or three numbers and/or letter(s)

(f1) - Suitable for outdoor use with respect to exposure to Ultraviolet Light, Water Exposure and Immersion in accordance with UL 746C.

Flammability	Value	Test Method
Flame Rating		UL 94
1.5 mm, ALL	V-0	IEC 60695-11-10, -20
3.0 mm, ALL	V-0	
Glow Wire Flammability Index		IEC 60695-2-12
1.5 mm	960 °C	
3.0 mm	960 °C	
Glow Wire Ignition Temperature		IEC 60695-2-13
1.5 mm	825 °C	
3.0 mm	825 °C	
Electrical	Value	Test Method
Hot-wire Ignition (HWI) (1.5 mm)	PLC 3	UL 746
High Amp Arc Ignition (HAI) (1.5 mm)	PLC 3	UL 746
Comparative Tracking Index (CTI)	PLC 3	UL 746
Dielectric Strength	32 kV/mm	ASTM D149
Volume Resistivity	1.0E+17 ohms·cm	ASTM D257 IEC 60093
Thermal	Value	Test Method
RTI Elec		UL 746
1.5 mm	130 °C	
3.0 mm	130 °C	
RTI Imp		UL 746
1.5 mm	130 °C	
3.0 mm	130 °C	
RTI Str		UL 746
1.5 mm	130 °C	
3.0 mm	130 °C	
Ball Pressure Test (130°C)	Pass	IEC 60695-10-2
Physical	Value	Test Method
Outdoor Suitability	f1	UL 746C



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Report No.:
CTK-2023-01884
Page (17) / (29) pages

Attachment 2 – Parts List



Component - Plastics

File Number: E207780

SABIC JAPAN L L C
PACIFIC GRADES - RESIN
2-2 KINUGAOKA
MOKA-SHI, Tochigi 321-4392 Japan



Lexan, ELCRES, ELCRIN: EXL9330(X)(f1)(GG)(B1)(IP), EXL9330B(X)(f1)(GG)(B1)(IP) (T N 18)

PC/Siloxane, pellets

(B1) - Represents colour code BK1E526 and BK1E649

(f1) - Suitable for outdoor use with respect to exposure to Ultraviolet Light, Water Exposure and Immersion in accordance with UL 746C.

(GG) - Denotes a global grade formulation previously in File E161759.

(X) - All colors except natural.

B1 - Represents color code BK1E526, BK1E649 and BK1E519

IP - Inclined Plane Tracking per UL746A, average time to track at 1.5 kV is 60+ minutes.

NOTE - Material designation may be followed by a color nomenclature consisting of either an alpha/numeric or numeric/alpha combination.

T N 18 - Trade name Lexan, ELCRES represent EXL9330 and ELCRIN represents EXL9330B

Flammability	Value	Test Method
Flame Rating		
0.70 mm, ALL	HB	UL 94
0.8 mm, (B1)	V-1	UL 94 IEC 60695-11-10, -20
1.5 mm, (X)	V-0	UL 94 IEC 60695-11-10, -20
2.0 mm, (X)	V-0	UL 94 IEC 60695-11-10, -20
2.3 mm, (X)	V-0	UL 94 IEC 60695-11-10, -20
2.5 mm, BK, GY	V-0, 5VB	UL 94 IEC 60695-11-10, -20
3.0 mm, (X)	V-0, 5VA	UL 94 IEC 60695-11-10, -20
0.70 mm, ALL	HB75	IEC 60695-11-10, -20
Glow Wire Flammability Index		IEC 60695-2-12
1.0 mm	960 °C	
1.5 mm	960 °C	
2.0 mm	960 °C	
2.3 mm	960 °C	
2.5 mm	960 °C	
3.0 mm	960 °C	
Glow Wire Ignition Temperature		IEC 60695-2-13
1.0 mm	825 °C	
1.5 mm	825 °C	
2.0 mm	825 °C	
2.3 mm	825 °C	
2.5 mm	825 °C	
3.0 mm	825 °C	



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Report No.:
CTK-2023-01884
Page (18) / (29) pages

Attachment 2 – Parts List

Component - Plastics

File Number: E207780



Electrical	Value	Test Method
Hot-wire Ignition (HWI)		UL 746A
0.60 mm	PLC 3	
0.63 mm	PLC 3	
0.70 mm	PLC 3	
0.8 mm	PLC 3	
1.0 mm	PLC 3	
1.5 mm	PLC 2	
2.0 mm	PLC 2	
2.3 mm	PLC 2	
2.5 mm	PLC 2	
3.0 mm	PLC 1	
High Amp Arc Ignition (HAI)		UL 746A
0.60 mm	PLC 1	
0.63 mm	PLC 1	
0.70 mm	PLC 1	
0.8 mm	PLC 1	
1.0 mm	PLC 1	
1.5 mm	PLC 1	
2.0 mm	PLC 1	
2.3 mm	PLC 0	
2.5 mm	PLC 0	
3.0 mm	PLC 0	
Comparative Tracking Index (CTI)	PLC 3	UL 746A
Dielectric Strength	25 kV/mm	ASTM D149
Inclined-Plane Tracking	1.5 kV	ASTM D2303
Volume Resistivity	1.0E+17 ohms-cm	ASTM D257 IEC 60093
Thermal	Value	Test Method
RTI Elec		UL 746B
0.60 mm	80.0 °C	
0.63 mm	125 °C	
0.70 mm	125 °C	
0.8 mm	125 °C	
1.0 mm	125 °C	
1.5 mm	125 °C	
2.0 mm	125 °C	
2.3 mm	125 °C	
2.5 mm	125 °C	
3.0 mm	125 °C	
RTI Imp		UL 746B
0.60 mm	80.0 °C	
0.63 mm	105 °C	
0.70 mm	105 °C	
0.8 mm	105 °C	
1.0 mm	105 °C	
1.5 mm	110 °C	
2.0 mm	110 °C	
2.3 mm	110 °C	
2.5 mm	110 °C	
3.0 mm	115 °C	



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Report No.:
CTK-2023-01884
Page (19) / (29) pages

Attachment 2 – Parts List

Component - Plastics
File Number: E207780



Thermal	Value	Test Method
RTI Str		UL 746B
0.60 mm	80.0 °C	
0.63 mm	115 °C	
0.70 mm	115 °C	
0.8 mm	115 °C	
1.0 mm	115 °C	
1.5 mm	120 °C	
2.0 mm	120 °C	
2.3 mm	120 °C	
2.5 mm	120 °C	
3.0 mm	125 °C	
Physical	Value	Test Method
Dimensional Change	0.0 %	ASTM D1042 ISO 2796
Outdoor Suitability	f1	UL 746C



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Report No.:
CTK-2023-01884
Page (20) / (29) pages

Attachment 2 – Parts List



Component - Plastics

File Number: E41613

Covestro Deutschland AG
Chempark, Gebaeude B207
Leverkusen, Nordrhein-Westfalen 51368 Germany



Makrolon: 2407 + (z)(f2), 2407 + RE (f2)

Polycarbonate (PC), pellets

- (f2) - Subjected to one or more of the following tests: Ultraviolet Light, Water Exposure or Immersion in accordance with UL 746C, where the acceptability for outdoor use is to be determined by UL.
- (z) - Material designation and color code may be followed by up to three letters and/or three numbers (does not include grades which are separately recognized with above material designation and suffix)
- + - Material designations may be followed by a six digit numerical code denoting color.

Flammability	Value	Test Method
Flame Rating		
2.7 mm, ALL	HB	UL 94
3.0 mm, ALL	HB	UL 94
6.0 mm, ALL	HB	UL 94
0.60 mm, TL	V-2	UL 94 IEC 60695-11-10, -20
0.75 mm, ALL	V-2	UL 94 IEC 60695-11-10, -20
1.5 to 2.6 mm, ALL	V-2	UL 94 IEC 60695-11-10, -20
3.0 mm, ALL	HB40	IEC 60695-11-10, -20
6.0 mm, ALL	HB40	IEC 60695-11-10, -20
2.7 mm, ALL	HB75	IEC 60695-11-10, -20
Electrical	Value	Test Method
Hot-wire Ignition (HWI)		UL 746A
1.5 to 2.6 mm	PLC 3	
2.7 mm	PLC 3	
3.0 mm	PLC 2	
6.0 mm	PLC 0	
High Amp Arc Ignition (HAI)		UL 746A
1.5 to 2.6 mm	PLC 0	
2.7 mm	PLC 0	
3.0 mm	PLC 0	
6.0 mm	PLC 0	
Comparative Tracking Index (CTI)	PLC 2	UL 746A
Dielectric Strength	25 kV/mm	ASTM D149
High Voltage Arc Tracking Rate (HVTR)	PLC 0	UL 746A
Volume Resistivity	1.0E+15 ohms-cm	ASTM D257 IEC 60093
Arc Resistance	PLC 5	ASTM D495



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Report No.:
CTK-2023-01884
Page (21) / (29) pages

Attachment 2 – Parts List

Component - Plastics File Number: E41613



Thermal	Value	Test Method
RTi Elec		UL 746B
0.60 mm	80.0 °C	
0.75 mm	125 °C	
1.5 to 2.6 mm	125 °C	
2.7 mm	125 °C	
3.0 mm	125 °C	
6.0 mm	125 °C	
RTi Imp		UL 746B
0.60 mm	80.0 °C	
0.75 mm	115 °C	
1.5 to 2.6 mm	115 °C	
2.7 mm	115 °C	
3.0 mm	115 °C	
6.0 mm	115 °C	
RTi Str		UL 746B
0.60 mm	80.0 °C	
0.75 mm	125 °C	
1.5 to 2.6 mm	125 °C	
2.7 mm	125 °C	
3.0 mm	125 °C	
6.0 mm	125 °C	
Physical	Value	Test Method
Dimensional Change	0.0 %	ASTM D1042 ISO 2796
Outdoor Suitability	f2	UL 746C



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Report No.:
CTK-2023-01884
Page (22) / (29) pages

Attachment 2 – Parts List



Component - Plastics

File Number: E41179

MITSUBISHI ENGINEERING-PLASTICS CORP
ENVIRONMENT & QUALITY ASSURANCE DEPT
SHIODOME SUMITOMO-BLDG 25TH FL
1-9-2 HIGASHI-SHINBASHI
MINATO-KU, TOKYO 105-0021 Japan



S-2000V+(f1), S-2001V+(f1)

Polycarbonate (PC), pellets, unreinforced

(f1) - Suitable for outdoor use with respect to exposure to Ultraviolet Light, Water Exposure and Immersion in accordance with UL 746C.

+ - Suffix optional, exceptions: The following cannot be used as optional suffixes: "NF" for grade NXG5050, "N" for grade NXG5030, "N" for grade MB2112+, "S1" for grade F20-54, "V" for grades S-2000+(f1), S-2001+(f1), S-2003+(f1), the last letter "L" for grade CFH2520+, "W" for ELV2010 included in Grade ELV20(a5)+, "V" for grade MB2210+.

Flammability	Value	Test Method
Flame Rating		UL 94
0.38 mm, ALL	V-2	IEC 60695-11-10, -20
1.5 mm, ALL	V-2	
3.0 mm, ALL	V-2	
Electrical	Value	Test Method
Hot-wire Ignition (HWI)		UL 746A
1.5 mm	PLC 3	
3.0 mm	PLC 3	
High Amp Arc Ignition (HAI)		UL 746A
1.5 mm	PLC 0	
3.0 mm	PLC 0	
Comparative Tracking Index (CTI)	PLC 2	UL 746A
Dielectric Strength	20 kV/mm	ASTM D149
High Voltage Arc Tracking Rate (HVTR)	PLC 0	UL 746A
Volume Resistivity	1.0E+7 ohms-cm	ASTM D257 IEC 60093
Arc Resistance	PLC 5	ASTM D495
Thermal	Value	Test Method
RTI Elec		UL 746B
0.38 mm	80.0 °C	
1.5 mm	125 °C	
3.0 mm	125 °C	
RTI Imp		UL 746B
0.38 mm	80.0 °C	
1.5 mm	115 °C	
3.0 mm	115 °C	
RTI Str		UL 746B
0.38 mm	80.0 °C	
1.5 mm	125 °C	
3.0 mm	125 °C	
Physical	Value	Test Method
Dimensional Change	0.0 %	ASTM D1042 ISO 2796
Outdoor Suitability	f1	UL 746C



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Report No.:
CTK-2023-01884
Page (23) / (29) pages

Attachment 2 – Parts List

TRIEX® Compound 3025G10

Polycarbonate
Samyang Corporation

PROSPECTOR®
www.ulprospector.com

Technical Data

Product Description

TRIEX® Compound 3025G10 is a Polycarbonate (PC) product. It is available in Asia Pacific, Europe, or North America. Primary characteristic: flame rated.

General

Material Status	• Commercial: Active
UL Yellow Card ¹	• E121254-100185827 • E121254-220607 • E257054-521418 • E257054-521420 • E368374-101723908
Search for UL Yellow Card	• Samyang Corporation • TRIEX® Compound
Availability	• Asia Pacific • Europe • North America
Forms	• Pellets

Physical	Nominal Value Unit	Test Method
Density / Specific Gravity	1.25 g/cm ³	ASTM D792
Melt Mass-Flow Rate (MFR) (300°C/1.2 kg)	8.0 g/10 min	ASTM D1238
Molding Shrinkage - Flow	0.30 to 0.50 %	ASTM D955
Water Absorption (24 hr, 23°C)	0.13 %	ASTM D570
Mechanical	Nominal Value Unit	Test Method
Tensile Strength (Yield)	83.4 MPa	ASTM D638
Tensile Elongation (Break)	8.0 %	ASTM D638
Flexural Modulus	3430 MPa	ASTM D790
Flexural Strength (Yield)	127 MPa	ASTM D790
Impact	Nominal Value Unit	Test Method
Notched Izod Impact (23°C, 3.18 mm)	120 J/m	ASTM D256
Hardness	Nominal Value Unit	Test Method
Rockwell Hardness (R-Scale)	121	ASTM D785
Thermal	Nominal Value Unit	Test Method
Deflection Temperature Under Load 0.45 MPa, Unannealed	150 °C	ASTM D648
1.8 MPa, Unannealed	144 °C	
CLTE - Flow	4.3E-5 cm/cm/°C	ASTM D696
Electrical	Nominal Value Unit	Test Method
Volume Resistivity	4.0E+16 ohms-cm	ASTM D257
Dielectric Strength	31 kV/mm	ASTM D149
Dielectric Constant	2.97	ASTM D150
Dissipation Factor	9.6E-3	ASTM D150
Arc Resistance	120 sec	ASTM D495
Flammability	Nominal Value Unit	Test Method
Flame Rating	HB	UL 94

Notes

¹ A UL Yellow Card contains UL-verified flammability and electrical characteristics. UL Prospector continually works to link Yellow Cards to individual plastic materials in Prospector, however this list may not include all of the appropriate links. It is important that you verify the association between these Yellow Cards and the plastic material found in Prospector. For a complete listing of Yellow Cards, visit the UL Yellow Card Search.

² Typical properties: these are not to be construed as specifications.

1 of 2



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Report No.:
CTK-2023-01884
Page (24) / (29) pages

Attachment 2 – Parts List

TRIREX® Compound 3025G10

Polycarbonate

Samyang Corporation

PROSPECTOR®

www.ulprospector.com

Where to Buy

Supplier

Samyang Corporation
Seoul, Seoul South Korea
Telephone: +82-2-740-7114
Web: <http://www.samyang.com>

Distributor

API-Kolon Engineering Plastics
Telephone: 847-550-5556
Web: <http://www.apikolon.com/>
Availability: Mexico, North America, South America

Entec Polymers
Telephone: 800-375-5440
Web: <http://www.entecpolymers.com/>
Availability: North America

ESSE International - OMYA

ESSE International - OMYA is a Pan European distribution company. Contact ESSE International - OMYA for availability of individual products by country.

Telephone: +33-1-30-80-56-56
Web: <http://www.omya.com>
Availability: France

GAZECHIM PLASTIQUES

GAZECHIM PLASTIQUES is a Pan European distribution company. Contact GAZECHIM PLASTIQUES for availability of individual products by country.

Telephone: +33-4-67-49-55-37
Web: <http://www.gazechim.com/>
Availability: Belgium, Denmark, Finland, France, Italy, Netherlands, Norway, Poland, Romania, Spain, Sweden, United Kingdom

PolySource

Telephone: 866-558-5300
Web: <http://www.polysource.net/>
Availability: North America

Resinal de México

Telephone: +52-55-5254-7600
Web: <http://resinal.mx/>
Availability: Mexico

Ultrapolymers

Ultrapolymers is a Pan European distribution company. Contact Ultrapolymers for availability of individual products by country.

Telephone: +32-11-57-95-57
Web: <http://www.ultrapolymers.com/>
Availability: Turkey



Attachment 3 – Photographs

Test Unit





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Report No.:
CTK-2023-01884
Page (26) / (29) pages

Attachment 3 – Photographs

Hose down test





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CTK-2023-01884
Page (27) / (29) pages

Attachment 3 – Photographs

Test Result



Attachment 3 – Photographs



Attachment 3 – Photographs



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