



COPY

NIPPON KAIJI KYOKAI

Certificate

Certificate No.
TA211225E(N)

OF

APPROVAL

Item	:	BALLAST WATER MANAGEMENT SYSTEM
Product name	:	GloEn-Patrol 2.0
Specifications	:	See Annex 1.
Applicant	:	PANASIA CO., LTD 55, Mieumsandan 3-ro, Gangseo-gu, Busan, Korea
Manufacturer	:	The same as the Applicant.
Testing standard	:	IMO Resolution MEPC.300(72) BWMS Code
Drawings	:	See Annex 1.
System Design Limitations	:	See Annex 1.
Test results	:	See Annex 2.

THIS IS TO CERTIFY that the above ballast water management system has been approved by Nippon Kaiji Kyokai with approval No.BW005 under the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use of the Society, and has been examined and tested in accordance with the requirements of the specifications contained in the BWMS Code (resolution MEPC.300(72)). This certificate is valid only for the ballast water management system referred to above.

A copy of this Certificate shall be carried on board a ship fitted with this ballast water management system, for inspection on board the ship. If the Certificate is issued based on approval by another Administration, reference to that Type Approval Certificate shall be made.

This certificate is valid until 9 November 2026.

Issued at Tokyo on 10 November 2021.

NIPPON KAIJI KYOKAI



Y. Takao

General Manager
Material and Equipment Department



1. Specifications

Model designations: P50, P150, P150-Ex, P250, P250-Ex, P300, P300-Ex, P350, P350-Ex, P500, P500-Ex, P700, P700-Ex, P750, P750-Ex, P750-1, P750-1-Ex, P800, P800-Ex, P800-1, P800-1-Ex, P900, P900-Ex, P900-1, P900-1-Ex, P1000, P1000-Ex, P1000-1, P1000-1-Ex, P1200, P1200-Ex, P1200-1, P1200-1-Ex, P1500, P1500-Ex, P1500-1, P1500-1-Ex, P2000, P2000-Ex, P2000-1, P2000-1-Ex, P2500, P2500-Ex, P2500-1, P2500-1-Ex, P3000, P3000-Ex, P3000-1, P3000-1-Ex, P3500, P3500-Ex, P4000, P4000-Ex, P4500, P4500-Ex, P5000, P5000-Ex, P6000, P6000-Ex

Treatment rated capacity: 50-6000 m³/h

Treatment sequence:

- Ballast water uptake: Filtration & UV treatment
- Ballast water discharge: UV treatment

The system shall be cleaned through draining of remaining water from the filter and UV unit after ballasting or de-ballasting operation.

Equipment list: BILL OF MATERIAL (Drawing No.: PAD-USCH-01 Rev. H)

2. Drawings

Title	Drawing ID.	Rev.
Piping & instrument diagram (P&ID)	PAD-USCG-03	H
General Arrangement of Drawing (BWMS All model drawing)	PAD-USCG-02	D
Detailed drawings of all main components	PAD-USCG-02	D
Electrical Wiring Diagram	PAD-USCG-05	D
Instruction Manual	PAD-USCG-07	Q
Software Design Documentation	SDD-10-001	3.30.1

3. System Design Limitations

This equipment has been designed for operation in the following conditions:

Temperature and Salinity:

Temperature and salinity of the ballast water are not a limiting condition for the ballast water treatment system.

Holding time:

GloEn-Patrol 2.0 BWMS has demonstrated performance to the discharge standard with a minimum holding time between uptake and discharge of 24 hours in land-based testing. UV treatment is instant and does not require any hold time in a ballast tank to render organisms inviable. Therefore, holding time is not found to be a limiting condition for the ballast water management system.

**Dosing:**

The system applies a UV dose controlled by flow and UV intensity. The low limit for UV intensity at full flow or half flow treatment is listed below. The system also includes UV-lamp power optimization control at higher UV intensity.

UV-reactor size [m³/h]	UV intensity lower limit in marine or brackish water at full flow (TRC) ⁽¹⁾	UV intensity lower limit in fresh water at full flow (TRC) ⁽²⁾	UV intensity lower limit in all salinities at half flow (50% TRC) ⁽³⁾
50- 6000	70 mW/cm²	90 mW/cm²	60 mW/cm²

(1) UV intensity set point for full flow treatment in marine and brackish water, corresponding to an UV transmission of approx. 55-60%. Below this UV intensity limit, ballast water will automatically be treated with a reduced flow of 50% TRC.

(2) UV intensity set point for full flow treatment in fresh water, corresponding to an UV transmission of approx. 70%. Below this UV intensity limit, ballast water will be treated with a reduced flow of 50% TRC.

(3) UV intensity set point for lower limit, corresponding to an UV transmission of approximately 50-55%. Below this UV intensity limit, the ballast water is not treated in accordance with this certificate and alarm will be triggered at ≤ 59 mW/cm².

Treatment Rated Capacity:

The Treatment Rated Capacities (TRC) of the designated GloEn-Patrol 2.0 BWMS models are listed in the table below.

The table also specifies the major components that shall be installed for a specific GloEn-Patrol 2.0 BWMS model.

UV Reactors and filter units can be installed in parallel configuration to achieve higher flow capacities according to the design and installation guide and the table below.

The BWMS controls the flow rate in the ballast water line by using a flow control valve to ensure that flow rates are kept within the TRC of a specific model.

Model	TRC (m³/h)	Filter unit	UV unit (number of lamps)
GloEn-P50	50	PF50	PU50 (2)
GloEn-P150 (-Ex)	150	PF250	PU250 (6)
GloEn-P250 (-Ex)	250		PU250 (8)
GloEn-P300 (-Ex)	300	PF500	PU250 (12)
GloEn-P350 (-Ex)	350		PU500 (18)
GloEn-P500 (-Ex)	500		
GloEn-P700 (-Ex)	700	PF750	PU500 (24)
GloEn-P750 (-Ex)	750		PU1000 (22)
GloEn-P750-1 (-Ex)	750		PU250 (8) + PU500 (18)
GloEn-P800 (-Ex)	800	PF900	PU1000 (22)
GloEn-P800-1 (-Ex)	800	2 x PF500	PU250 (12) + PU500 (18)
GloEn-P900 (-Ex)	900	PF900	PU1000 (22)
GloEn-P900-1 (-Ex)	900	2 x PF500	2 x PU500 (18)
GloEn-P1000 (-Ex)	1,000	PF1200	PU1000 (22)
GloEn-P1000-1 (-Ex)	1,000	2 x PF500	2 x PU500 (18)

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GloEn-P1200 (-Ex)	1,200	PF1200	PU1250 (26)
GloEn-P1200-1 (-Ex)	1,200	2 x PF750	2 x PU500 (24)
GloEn-P1500 (-Ex)	1,500	PF1500	PU1500 (32)
GloEn-P1500-1 (-Ex)	1,500	3 x PF500	3 x PU500 (18)
GloEn-P2000 (-Ex)	2,000	PF2000	2 x PU1000 (22)
GloEn-P2000-1 (-Ex)	2,000	3 x PF750	3 x PU500 (24)
GloEn-P2500 (-Ex)	2,500	PF2500	2 x PU1250 (26)
GloEn-P2500-1 (-Ex)	2,500	PF2500	4 x PU500 (24)
GloEn-P3000 (-Ex)	3,000	PF3000	2 x PU1500 (32)
GloEn-P3000-1 (-Ex)	3,000	PF3000	6 x PU500 (18)
GloEn-P3500 (-Ex)	3,500	3 x PF1200	3 x PU1250 (26)
GloEn-P4000 (-Ex)	4,000	3 x PF1500	3 x PU1500 (32)
GloEn-P4500 (-Ex)	4,500	3 x PF1500	3 x PU1500 (32)
GloEn-P5000 (-Ex)	5,000	2 x PF2500	4 x PU1250 (26)
GloEn-P6000 (-Ex)	6,000	2 x PF3000	4 x PU1500 (32)

NOTE:

This table shows general system configuration as recommended by the manufacturer. A GloEn-Patrol 2.0 BWMS model may be used with a larger filter unit than specified above. The maximum TRC of any configuration is determined by either the maximum capacity of the UV unit or the filter unit, whichever is smaller.

Pressure:

The minimum/maximum pressure and the pressure differential triggering backflushing are listed below.

Filter type	Minimum inlet pressure (back - pressure)	Differential pressure triggering backflushing	Maximum operating pressure
Panasia PF	> 0.1 MPa	≥ 0.01 MPa	1.0 MPa

Hazardous area / Ex-proof:

Installation of the filters, UV reactor, valves and flowmeters in a hazardous area is to be approved in each case according to Part H of RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS.

The electrical supply and control systems are to be located in safe zone. Ex-certification is not covered by this certificate.

Examination of products:

Examination of products to be carried out in accordance with 11.7 Part 2 Chapter 11 of GUIDANCE FOR THE APPROVAL AND TYPE APPROVAL OF MATERIALS AND EQUIPMENT FOR MARINE USE.



Test results

Reference test reports:

- Land-based testing using GloEn-P250 model with PF250 filter and PU250(8) UV reactor at GBF in accordance with Resolution MEPC.279(70) and USCG 46 CFR 162.060-26
- Land-based testing using GloEn-P250 model with PF250 filter and PU250(8) UV reactor at DHI Denmark in accordance with Resolution MEPC.279(70) and USCG 46 CFR 162.060-26
- Shipboard testing using GloEn-P1000 model with PF1200 filter and PU1000 UV reactor in accordance with Resolution MEPC.279(70) and USCG 46 CFR 162.060-28
- Function tests of the control and automation system witnessed by DNV GL
- Environmental testing in accordance with DNVGL-CG-0339 Standard for Certification Nov. 2015 "Environmental test specification for electrical, electronic and programmable equipment and systems", Resolution MEPC.279(70), USCG 46 CFR 162.060-30 and IACS E10
- Additional tests for validation of CFD model during land-based testing at DHI
- Land-based testing using GloEn-P250 at KOMERI in November 2015 for evaluation of regrowth in marine water.



Summary of testing:

Summary of land-based testing

Table 1 Test water conditions and operational data obtained during land-based testing of the GloEn-P250 BWMS with Panasia PF250 filter with a 50 µm mesh size and PU250(8) UV reactor, performed in period October 2015 to August 2017 at the GBF in USA and at DHI in Denmark. All water quality data are inlet samples and operational data are from ballasting operations.

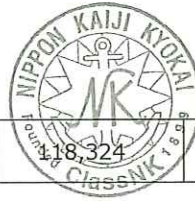
Test cycle	Salinity (PSU)	Temp. (°C)	POC (mg/L)	DOC (mg/L)	TSS (mg/L)	UVT (%)	UVI range ⁽¹⁾ (mW/cm ²)	Average flowrate (m ³ /h)		Holding time (days)
								Berfore filter	After filter	
Marine water test cycles										
KLB1	25	19	6.8	5.4	59	59	53	260	250	3
KLB2	25	19	7.5	7.2	57	59	56	260	250	3
KLB3	25	18	6.7	6.1	66	60	59	260	251	3
KLB4	25	18	7.9	7.2	65	59	57	260	247	3
KLB5	25	16	8.1	7.1	60	61	54	260	250	3
KLB6	25	16	10.6	12	66	50	52	200	186	3
KLB7	24	14	7.8	7.6	98	58	65	260	249	3
KLB8	24	14	6.8	6.7	88	59	67	260	249	3
M-1	28	9.0	6.5	9.9	48	67	82-84	264	248	1
M-2	28	9.4	6.5	9.9	48	67	87-88	266	247	1
M-3	28	19	7.3	8.0	44	69	76-85	134	125	2
M-4	27	19	7.3	8.0	44	69	76-82	134	126	2
Brackish water test cycles										
B-1	17	5.3	8.3	8.0	68	71	94-96	280	245	1
B-2	17	5.5	8.3	8.0	68	71	93-97	273	240	1
B-3	19	7.6	7.4	8.3	67	62	96-100	263	243	1
B-4	19	7.9	7.5	7.6	57	63	97-100	260	247	5
B-5	19	8.0	7.5	7.6	57	63	95-99	260	249	5
B-6	17	17	7.4	8.5	58	64	87-90	263	247	2
B-7	18	17	7.3	11	56	58	63-70	129	122	2
B-8	18	17	7.3	11	56	58	63-68	130	126	2
Fresh water test cycles										
F-1	0.4	16	5.8	7.2	59	49	65-68	134	125	5
F-2	0.4	16	5.8	7.2	59	49	66-67	134	124	5
F-3	0.4	18	6.6	6.8	71	47	59-61	140	122	5
F-4	0.4	16	5.8	6.0	69	52	58-69	140	124	2
F-5	0.4	16	5.8	6.0	69	52	59-67	139	125	2
F-6	0.4	17	5.6	6.4	64	52	58-64	139	126	5
F-7	0.4	17	5.6	6.4	64	52	58-62	139	125	5



(1) For test cycles KLB1 to KLB8 performed at GBF, only average UV-I values are available from the test report; For the test cycles performed at DHI, the UV-I range measured and logged during stable ballasting operation conditions are reported.

Table 2 Average densities of live organisms in inlet and treated discharge water during land-based testing of the GloEn-P250 BWMS with PF250 filter with a 50 µm mesh size and PU250(8) UV reactor. Live organisms ≥ 10 and < 50 µm in inlet water were quantified based on CMFDA/FDA, and in discharge water based on MPN method. All counts of pathogenic bacteria (*E. coli*, *Enterococci* and *Vibrio cholerae*) in treated water were below the ballast water discharge standard. Tests were performed in period October 2015 to August 2017 at the GBF in USA and at DHI in Denmark.

Test cycle	Organism densities in inlet water		≥ 50 µm organism densities in discharge water (organisms/m ³)		≥ 10 - < 50 µm organism densities in discharge water (organisms/mL)	
	≥ 50 µm (org/m ³)	≥ 10 - < 50 µm (org/mL)	Treated	Control	Treated	Control ⁽¹⁾
Marine water test cycles						
KLB1	171,313	1,723	0.1	202,424	< 0.08	227
KLB2	183,434	1,360	0.1	202,424	< 0.08	227
KLB3 ⁽²⁾	291,717	1,064	3.8	77,677	< 0.08	91.7
KLB4 ⁽²⁾	307,273	1,230	5.6	77,677	< 0.08	91.7
KLB5	144,949	4,630	4.9	172,525	0.3	329
KLB6	197,879	3,050	4.2	172,525	0.46	329
KLB7 ⁽³⁾	102,626	2,783	16	97,980	0.21	240
KLB8 ⁽³⁾	135,960	2,410	16	97,980	< 0.08	240
M-1	152,892	2,810	2.0	118,290	0.87	1,373
M-2	195,800	3,297	2.0	118,290	< 0.18	1,373
M-3 ⁽⁴⁾	186,914	1,146	0.0	21,877	0.19	$> 1,600$
M-4 ⁽⁴⁾	197,417	1,394	0.0	21,877	< 0.18	$> 1,600$
Brackish water test cycles						
B-1 ⁽⁵⁾	96,947	2,593	0.0	52,936	< 0.18	374
B-2 ⁽⁵⁾	92,728	2,693	0.0	52,936	< 0.18	374
B-3	118,625	1,320	0.3	36,906	< 0.18	$> 1,600$
B-4	240,644	1,186	0.0	70,355	< 0.18	$> 1,600$
B-5	257,959	1,188	0.0	70,355	< 0.18	$> 1,600$
B-6	246,347	1,072	0.7	164,600	< 0.18	$> 1,600$
B-7	284,514	2,560	7.7	118,324	< 0.18	1,373



B-8	425,972	2,692	0.7	118,324	<0.18	1,373
Fresh water test cycles						
F-1 ⁽⁶⁾	421,222	571	4.7	265,099	<0.18	1,147
F-2 ⁽⁶⁾	463,070	558	0.0	265,099	<0.18	1,147
F-3	812,383	1,864	0.3	469,261	<0.18	540
F-4	240,097	1,596	0.3	243,572	<0.18	>1600
F-5	224,958	1,578	0.3	243,572	<0.18	>1600
F-6	310,117	1,206	0.0	213,662	0.56	377
F-7 ⁽⁵⁾	304,889	900	0.0	213,662	<0.18	377

(1) While for control discharge the MPN results are presented (except test cycles KLB1 to KLB8), the control discharge samples were also compliant (>100 organisms/mL) after enumeration with microscopy counting after staining with FDA/CMFDA. For test cycles KLB1 to KLB8, the results in FDA/CMFDA are presented (no MPN data are available for control discharge).

(2) For test cycles KLB3 and KLB4, the organisms density in control discharge was 8% less than the required value of 100 org/mL for the $\geq 10 - < 50 \mu\text{m}$ size class.

(3) Test cycles KLB7 & KLB8 were performed with a filter differential pressure setpoint of 0.05 MPa for activating backflushing, which is outside the System Design Limit (SDL). All the other test cycles were performed with a setpoint of 0.01 MPa as specified in the final claim. Damage on filter screen was observed after the test.

(4) Test cycles M-3 and M-4 were performed with a UV-I reading of 76 - 85 mW/cm² at a half flow, under a set point of 90 mW/cm² for flow reduction, which is higher than the final SDL of 70 mW/cm² for GloEn-Patrol 2.0.

(5) For test cycles B-1 and B-2, the organisms density in inlet water was 3% and 7% less than the required value of 100,000 org/m³ for the $> 50 \mu\text{m}$ size class. For test cycle F-7, the organisms density in inlet water was 10% less than the required value of 1000 org/mL.

(6) For test cycles F-1 & F-2, the density of live organisms 10-50 μm in the inlet water was significantly below the required value of 100 org/mL, hence these test cycles were repeated and replaced by F-3 and F-4.



Summary of additional land-based testing

Table 3 Test water conditions and operational data obtained during additional land-based testing of the GloEn-P250 BWMS with Panasia PF250 filter with a 50 µm mesh size and PU250(8) UV reactor, performed in period September 2017 to July 2018 at DHI in Denmark. All water quality data are inlet samples and operational data are from ballasting operations.

Test cycle	Salinity (PSU)	Temp. (°C)	POC (mg/L)	DOC (mg/L)	TSS (mg/L)	UVT (%)	UVI range ⁽¹⁾ (mW/cm ²)	Average flowrate (m ³ /h)		Holding time (days)
								Berfore filter	After filter	
Marine water test cycles										
M-5	28	4.3	6.5	7.5	60	74	107-109	281	246	1
M-6	28	4.4	6.5	7.5	60	74	106-108	282	246	1
Brackish water test cycles										
B-9	18	16	7.9	12	56	55	66-70	257	252	1
B-10	18	16	7.9	12	56	55	66-69	253	243	1
B-11	18	18	5.9	11	49	56	64-70	275	248	1
B-12	18	19	5.9	11	49	56	67-69	277	248	1
Fresh water test cycles										
F-8	0.38	15	6.4	7.9	66	54	73-79	275	246	1
F-9	0.38	15	6.4	7.9	66	54	73-79	276	251	1
F-10	0.41	9.2	6.8	6.3	57	58	77-82	152	125	1
F-11	0.41	9.3	6.8	6.3	57	58	76-81	150	125	1
F-12	0.37	22	7.2	7.8	65	52	64-65	301	254	1
F-13	0.37	22	7.2	7.8	65	52	63-65	292	251	1
F-14	0.44	21	6.1	7.7	56	63	82-86	141	124	1
F-15	0.44	21	6.1	7.7	56	63	80-84	140	126	1
F-16	0.41	22	8.0	7.0	69	55	73-75	278	249	1
F-17	0.41	22	8.0	7.0	69	55	72-74	285	251	1

(1) The UV-I range measured and logged during stable ballasting operation conditions are reported.

Table 4 Average densities of live organisms in inlet and treated discharge water during additional land-based testing of the GloEn-P250 BWMS with PF250 filter with a 50 µm mesh size and PU250(8) UV reactor. Live organisms ≥ 10 and < 50 µm in inlet water were quantified based on CMFDA/FDA, and in discharge water based on MPN method. All counts of pathogenic bacteria (*E. coli*, Enterococci and *Vibrio cholerae*) in treated water were below the ballast water discharge standard. Tests were performed in period September 2017 to July 2018 at DHI in Denmark.

Test cycle	Organism densities in inlet water		≥ 50 µm organism densities in discharge water (organisms/m ³)		≥ 10 - < 50 µm organism densities in discharge water (organisms/mL)	
	≥ 50 µm (org/m ³)	≥ 10 - < 50 µm (org/mL)	Treated	Control	Treated	Control ⁽¹⁾



Marine water test cycles						
M-5	117,217	1,188	0.0	90,878	<0.18	1,600
M-6	100,950	1,263	0.3	90,878	<0.18	1,600
Brackish water test cycles						
B-9 ⁽²⁾	117,177	1,170	519	76,422	9.2	>1,600
B-10 ⁽²⁾	153,117	1,216	634	76,422	1.9	>1,600
B-11	394,672	2,324	1.7	110,106	2.3	>1,600
B-12	456,067	2,322	0.7	110,106	1.9	>1,600
Fresh water test cycles						
F-8 ⁽³⁾	452,900	1,214	19	178,185	4.0	1,147
F-9 ⁽³⁾	366,461	1,254	47	178,185	2.7	1,147
F-10	158,722	4,053	1.3	134,018	2.4	>1,600
F-11	140,042	3,731	0.3	134,018	3.0	>1,600
F-12	974,361	1,593	5.4	223,424	5.3	1,373
F-13 ⁽⁴⁾	790,000	1,544	17	223,424	9.8	1,373
F-14	450,545	1,927	2.3	205,335	<0.18	>1,600
F-15	665,278	2,038	0.0	205,335	0.67	>1,600
F-16 ⁽³⁾	936,750	1,012	27	322,743	3.3	>1,600
F-17 ⁽³⁾	752,889	1,147	19	322,743	4.2	>1,600

(1) While for control discharge the MPN results are presented, the control discharge samples were also compliant (>100 organisms/mL) after enumeration with microscopy counting after staining with FDA/CMFDA.

(2) During test cycles B-9 & B-10, the wiper for cleaning of UV lamp sleeves was operating continuously during ballasting, causing improper lower UV irradiation. This was due to an error in the setting of the software program. The error was corrected after these two tests cycles.

(3) Test cycles F-8, F-9, F-16 & F-17 were performed outside the final SDL (UV-I of 90 mW/cm² for full flow treatment) in fresh water.

(4) During the test cycle F-13, the BWMS stopped during ballasting due to fuel shortage on the power generator, leading untreated water entering test tank.



Summary of shipboard testing

Table 5 Results from shipboard testing of GloEn-Patrol BWMS, model GloEn-P1000 on board WOORYANG BANDERS in the period September 2016 to November 2017. Test conditions: salinity: 33–37 PSU, Temp: 14–30 °C, holding time: 1 day. Live organisms ≥ 10 and $< 50 \mu\text{m}$ in discharge water were quantified based on FDA/CMFDA method.

Test No.	UVT (%)	Flow rate ⁽¹⁾ (m ³ /h)	UVI (mW/cm ²)	Inlet density		Discharge density		
				$\geq 50 \mu\text{m}$ (org/m ³)	≥ 10 – $< 50 \mu\text{m}$ (org/mL)	$\geq 50 \mu\text{m}$ (org/m ³)	≥ 10 – $< 50 \mu\text{m}$ (org/mL)	$< 10 \mu\text{m}$
1 ⁽²⁾	98	1,011	74	6,655	29	3.3	0.67	Pass
2	71	995	93	11,973	205	6.8	0.83	Pass
3	92	1,005	97	33,790	2,073	1.1	0.33	Pass
4	92	1,011	115	105,613	732	0.5	1.3	Pass
5	92	1,008	108	231,301	682	0.8	2.0	Pass
6 ⁽³⁾	94	982	106	25,281	92	8.6	1.3	Pass

(1) Average flow rate after filtration during ballast operation of treated water.

(2) The density of live organisms ≥ 10 – $< 50 \mu\text{m}$ in the inlet water was significantly below the validity criterion, hence the test cycle was repeated.

(3) For test cycle No.6, density of live organisms ≥ 10 – $< 50 \mu\text{m}$ in inlet water was 10% less than of the required value of 100 org/mL.

Supporting data for evaluation of regrowth in marine water

Table 6 Results from land-based testing of GloEn Patrol BWMS, GloEn-P250 at KOMERI in November 2015. Test cycles were performed with marine water quality and a hold time of 5 days. Test conditions: Temp: 16–19°C, salinity: 32–33 PSU, Live organisms ≥ 10 and $< 50 \mu\text{m}$ in discharge water were quantified based on FDA/CMFDA method.

Test No.	UVT (%)	Flow rate (m ³ /h)	UVI (mW/cm ²)	Inlet density		Discharge density		
				$\geq 50 \mu\text{m}$ (org/m ³)	≥ 10 – $< 50 \mu\text{m}$ (org/mL)	$\geq 50 \mu\text{m}$ (org/m ³)	≥ 10 – $< 50 \mu\text{m}$ (org/mL)	$< 10 \mu\text{m}$
1	53.2	235 \pm 9	64 \pm 12	113,667	1,361	0 \pm 0.0	0.5 \pm 0.7	Pass
2	51.5	238 \pm 5	51 \pm 1	118,556	1,349	0 \pm 0.0	1.5 \pm 0.9	Pass
3	47.8	233 \pm 4	46 \pm 1	107,000	1,131	0 \pm 0.0	0.0 \pm 0.0	Pass

- The end of certificate -