



SPECIALTY CHEMICALS FOR PWB SURFACE TREATMENT

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MECSEAL CL-5018

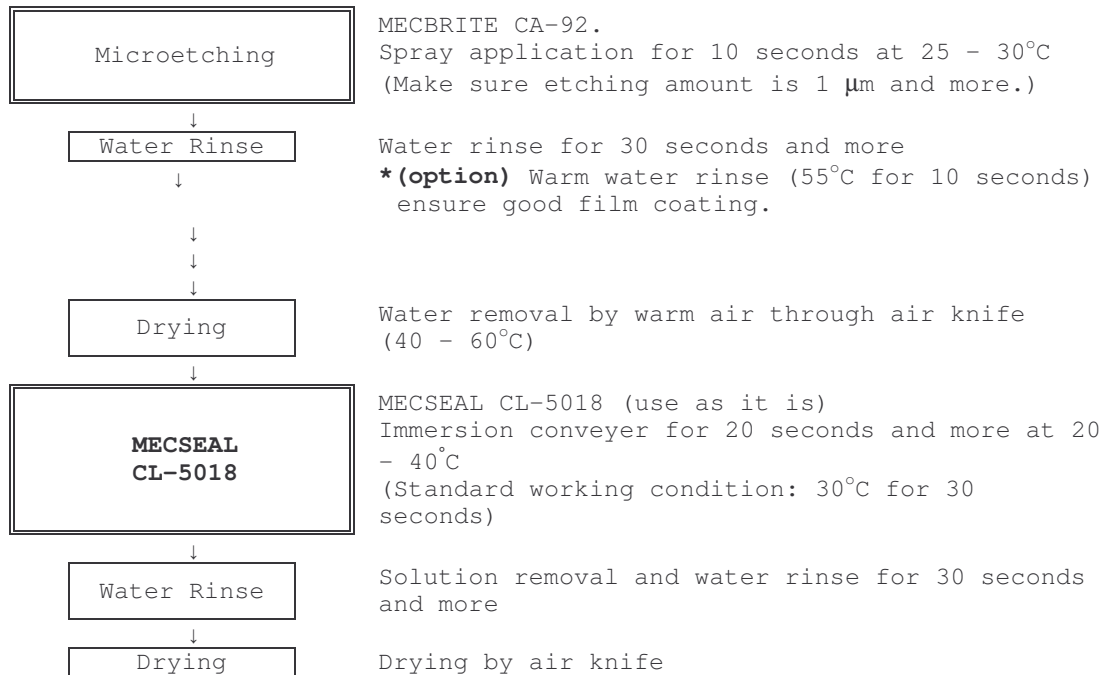
I. INTRODUCTION

MECSEAL CL-5018 is a heat-resistant water soluble preflux. Compared with conventional alkylimidazole type preflux, CL-5018 is less foamy and offers superior heat-resistance and solder wettability and spreadability. Even in short processing time, CL-5018 effectively forms heat-resistant anti-tarnish coating only on the copper surface. Since CL-5018 is easy to control, it offers excellent workability and safety.

II. PROPERTIES

APPEARANCE	Light blue liquid
ACID CONCENTRATION (mol/l)	3.98 ± 0.10

III. RECOMMENDED PROCESS AND PROCESSING CONDITIONS



IV. HOW TO USE

- 1) Use CL-5018 for make-up.

(CAUTION: Sedimentation or precipitation of effective elements of CL-5018 may occur due to freezing or solution temperature drop during storage. Take care of storage environments.)

As for replenishment, add CL-5018 according to control instructions. Float an oil blotter on the solution surface of the make-up bath (to absorb oil substances come up onto the surface during the treatment process.)

☆ During the winter, warm up CL-5018 to the room temperature (15 - 25°C) before making-up.

- 2) Avoid contamination of the CL-5018 bath solution by dragging-in of acid substances such as micro etchant and rinse water.
- 3) After pre-treatment, make sure to rinse the boards with water well, and dry them with an air blower. When water rinse is insufficiently and boards are not dried well, the OSP coating is not applied evenly.

V. CONTROL INSTRUCTIONS

Regular Control (once/day-week)

- 1) Regularly monitor the appearance (finishing) and the coated quantity of the boards to check the conditions of CL-5018 bath solution. Control the solution according to the results (acid concentration, effective element concentration) obtained by periodical analysis.

Control Range
Coated Quantity (ABS.) 0.5 and more

Values of wavelength and absorbance (ABS) is varied depending upon analysis accuracy of the measuring instruments used.

When there is no problem with appearance of the coating and coated quantity, adjust the solution level using CL-5018 (fresh solution). When coated quantity is decreased to 0.5 (ABS) or less, replace the whole solution.

- 2) Take measurements of effective element concentration and acid concentration periodically.
In the event appearance of the board becomes poor or coated quantity drops, adjust the make-up solution and conditions of the process line considering changes in the effective element concentration and in acid concentration. (The adjustment should be done after being confirmed that this is not attributable to any trouble of the facilities (roll, rinse water, etc.)
When the effective element concentration decreases to 70%, replace the solution partly or entirely with CL-5018 fresh solution.
When the difference between acid concentration and effective element concentration becomes more than 30%, replace the solution partly or entirely with CL-5018 fresh solution.

	Control Range
Effective element conc. (%)	70% and more
Acid concentration (%)	Difference between acid concentration and effective element concentration should be less than 30%.
* If either of the two items is not maintained within this range, replace the solution partly or entirely.	

- * It is recommended to replace the whole solution and clean the process line every 6 months in order to maintain stable solution quality.

VI. HOW TO ANALYZE

NOTE: UV meter is used for measurements of the coated quantity and effective element concentration. Note that the absorption peak may be different depending on the UV meter used. In order to make any judgment, check the peak of absorbance to decide the wavelength after reading the spectrum.
When measurement other than the fixed wavelength is not possible, please contact us.

How to measure coated quantity

- 1) Immerse and joggle a test board (4 x 4 cm double-sided glass epoxy copper clad laminate) in microetchant for 1 minute at the room temperature. (Etching amount: about 1 - 2 μm)
- 2) Rinse the test board with water and dry the board well.
- 3) Immerse the board into CL-5018 (30°C) for 30 seconds. Rinse the test board with water and dry the board immediately.
- 4) Prepare Solution (A)* for dissolving the coating.
- 5) Immerse the treated test board into Solution A (25 ml) for 5 minutes to dissolve the anti-tarnish coat completely.
- 6) Take the test board out.
- 7) Measure the peak of absorbance at the wavelength around 286.2 nm using Solution A* as a reference. (Use a quartz cell with the optical path width of 10 mm.)

$$\text{Coated quantity} = \text{Absorbance (ABS)}$$

To check the coated quantity on the line process, treat a double-sided copper clad laminate and cut it into 4 x 4 cm pieces. Calculate the coated quantity in accordance with procedure 4) - 7).

* Solution A:	35% hydrochloric acid	0.5 wt%
	Methanol	99.5 wt%

[How to measure coated quantity and wavelength: Spectrum analysis is not available]

- 1) Put the solution in which the coated film is dissolved into the cell. (Solution A should be used as a reference.)
- 2) Take measurement of the absorbance while wavelength is moved every 0.1 - 0.5 nm in the range of 280 - 290 nm.
- 3) The wavelength that gives a maximum absorbance should be regarded as the measurement wavelength.
- 4) Record the measurement wavelength and use this value hereafter to obtain the coated quantity.

How to measure effective element concentration

Correctly dilute the sample with methanol (reagent) 100-fold, and measure the peak of absorbance at the wavelength around 285.2 nm using methanol as a reference. (Use a quartz cell with the optical path width of 10 nm.)

* Measure within 5 minutes after dilution.

$$\text{Effective element concentration (\%)} = \boxed{\text{Coefficient K}} \times \text{Absorbance}$$

(The coefficient is varied depending on the UV meter used.)

With analytical instruments used by MEC, coefficient K is 148.

[How to obtain effective element concentration, wavelength and coefficient]

- 1) Take CL-5018 fresh solution, dilute it with methanol 100-fold, and put it into the cell. (Methanol should be used as a reference.)
- 2) Measure the absorbance while the wavelength is moving by 0.1 - 0.5 nm in the range of 280 - 290 nm.
- 3) The wavelength that gives a maximum absorbance should be regarded as the measurement wavelength.
- 4) Obtain coefficient K so that absorbance may become 100% at the maximum wavelength.

$$\text{Absorbance} \times K = 100 \Rightarrow K = 100 / \text{Absorbance}$$

- 5) Record the wavelength measured and the coefficient calculated. Use them hereafter to obtain the effective element concentration.

Measurement of acid concentration

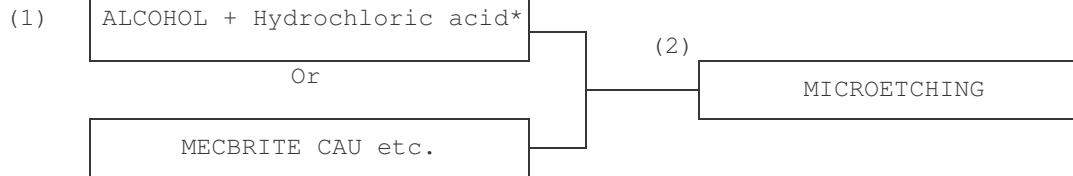
Correctly weigh 1 ml of the sample solution and add 15 ml of methanol, 35 ml of DI water and two drops of phenolphthalein indicator. Titrate by 0.1 mol/lit sodium hydroxide solution until the solution develops pink color.

$\begin{aligned}\text{Acid concentration (\%)} &= [(V \times F) / 39.8] \times 100 \\ &= 2.513 \times V \times F \\ \text{V: Titer (ml) by 0.1 mol/lit sodium hydroxide solution} \\ \text{F: Factor of 0.1 mol/lit sodium hydroxide solution}\end{aligned}$
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* The condition of fresh solution should be considered as 100%. (Titer: about 39.8 ml)

VII. HOW TO REMOVE COATING

Follow the steps below if the coating needs to be removed for repair and other purposes.



This process allows removal of coating.

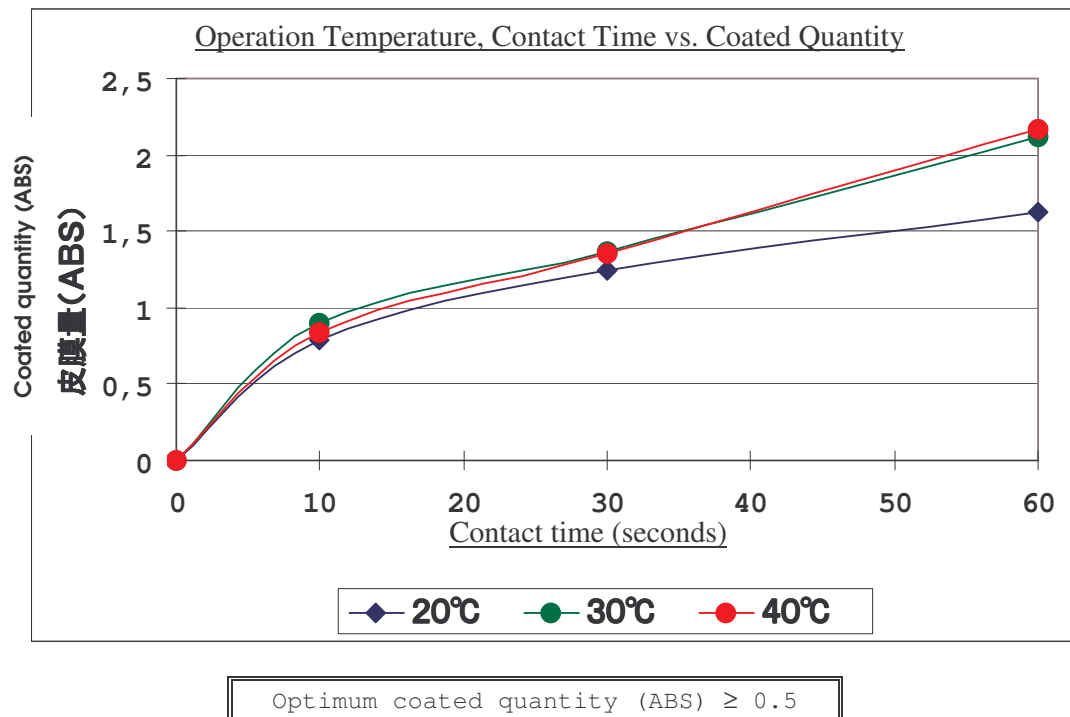
Make sure to treat with (1) before microetching. Otherwise, a smooth and even surface may not be formed.

* Solution of methanol (10 wt%) and 35% hydrochloric acid (1 - 5 wt%) works effectively.

VIII. PERFORMANCES

VIII-1. Solution Temperature, Contact Time vs. Coated Quantity

Tests are done with a fresh solution under ideal conditions.



VIII-2. SOLDERABILITY

Evaluation test - I <<Solder fitting>>

[Test Coupon]

MEC test coupon B - 2 (Through hole diameter 0.8 mm, 600 holes/piece)

[Process]

- 1) Pre-treatment MECBRITE CA-92 (Spray application for 10 sec at 25°C)
- 2) Water rinse, solution squeeze, drying
- 3) OSP treatment MECSEAL CL-5018 (Immersion for 30 seconds at 30°C)
Conventional products (Immersion for 60 seconds at 25°C)
- 4) Water rinse and drying

[Deterioration Conditions]

Heating conditions: Hot air circulating type reflow furnace
Max Temperature: About 220°C Over 200°C for 25 seconds

[Flow conditions]

Pre-heating at 100°C Solder temperature 235°C
Conveyer speed 1 m/min (Double wave)
Postflux RMA type

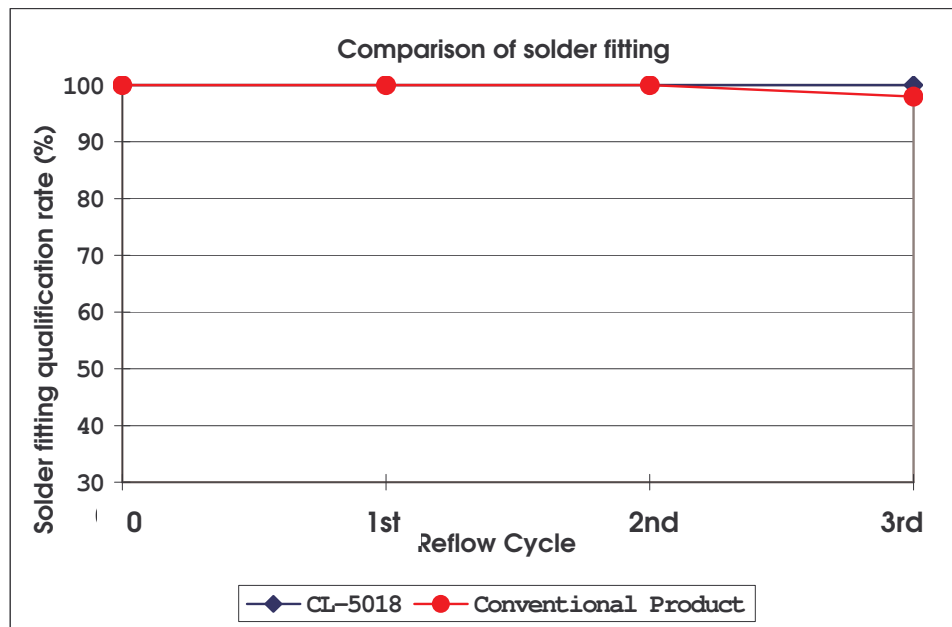
[Evaluation]

Solder fitting qualification rate (%): Through holes without problems / 600 holes

[Test Result]

Solder fitting qualification rate (%)

Reflow cycle	0	1st	2nd	3rd
CL-5018	100	100	100	100.0
Conventional Product	100	100	100	98.0



Evaluation test - II <<Solder spreadability and wettability>>

[Test Coupon]

MEC test coupon B-10 (See illustration shown below.)

Comb part	: 0.3×8mm	Metal Mask Pattern	φ0.4mm×t 100 μm
	: 0.4×8mm	Metal Mask Pattern	φ0.5mm×t 100 μm
Copper Part	: 10mm×10mm	Metal Mask Pattern	φ1.0mm×t 100 μm
	: 15mm×15mm	Metal Mask Pattern	φ2.0mm×t 100 μm

[Process]

- 1) Pre-treatment MECBRITE CA-92 (Spray application for 10 sec at 25°C)
- 2) Water rinse, draining, drying
- 3) OSP treatment MECSEAL CL-5018 (Immersion for 30 seconds at 30°C)
Conventional products (Immersion for 60 seconds at 25°C)
- 4) Water rinse and drying

[Deterioration Conditions]

Humidification conditions: 40°C, 95% RH, 96 hours

Heating conditions: Hot air circulating type reflow furnace

Max Temperature: About 220°C Over 200°C for 25 seconds

[Solder Paste]

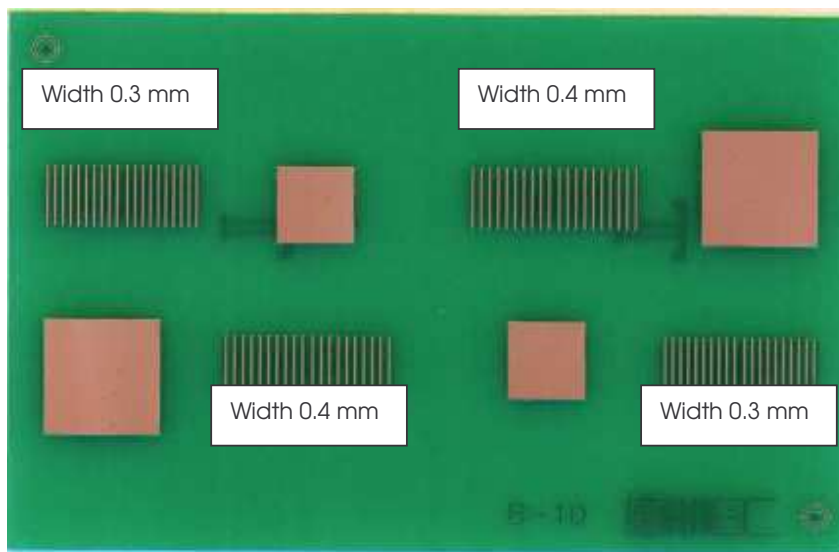
T company Eutectic RMA type

[Evaluation]

Comb part : spread length (mm)

Copper part : solder spread area (%)

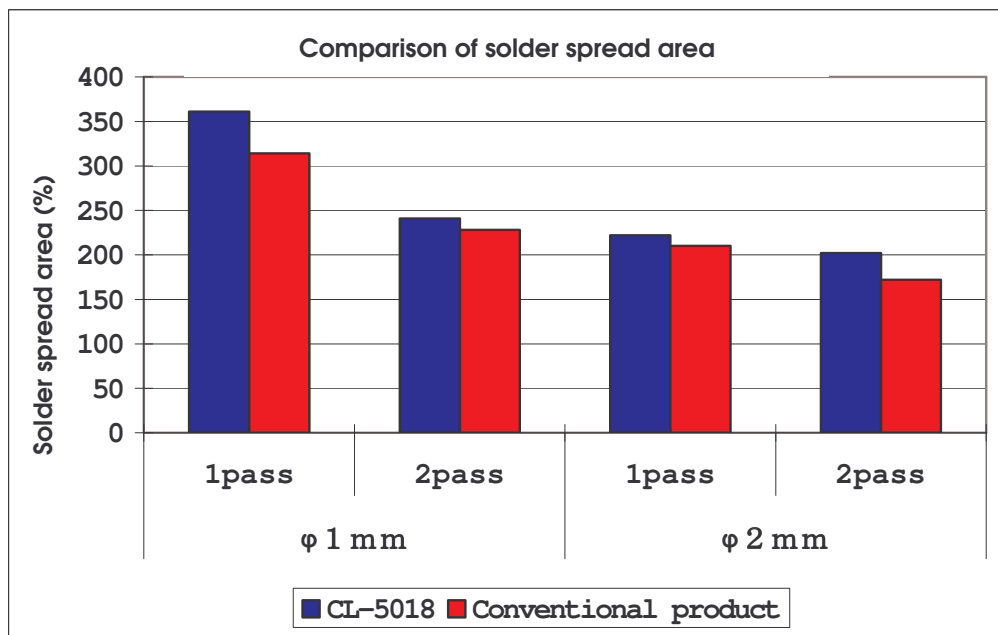
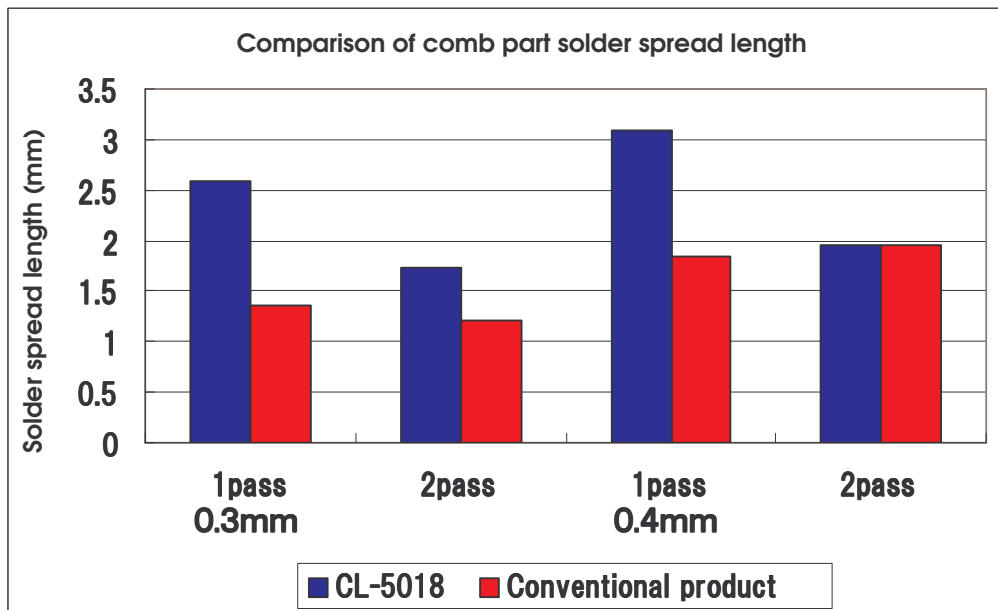
MEC test coupon B -10 for evaluation of solder spreadability and wettability



[Test Results]

Results of solder spreadability and wettability
(After deterioration by humidification conditions + Reflow)

	Comb part spread length (mm)				Copper part solder spread area (%)			
	Pad width 0.3 mm		Pad width 0.4 mm		φ 1.0 mm		φ 2.0 mm	
Reflow Cycle	1st	2nd	1st	2nd	1st	2nd	1st	2nd
CL-5018	2.591	1.728	3.082	1.961	361	241	222	202
Conventional product	1.354	1.214	1.834	1.963	314	228	210	172

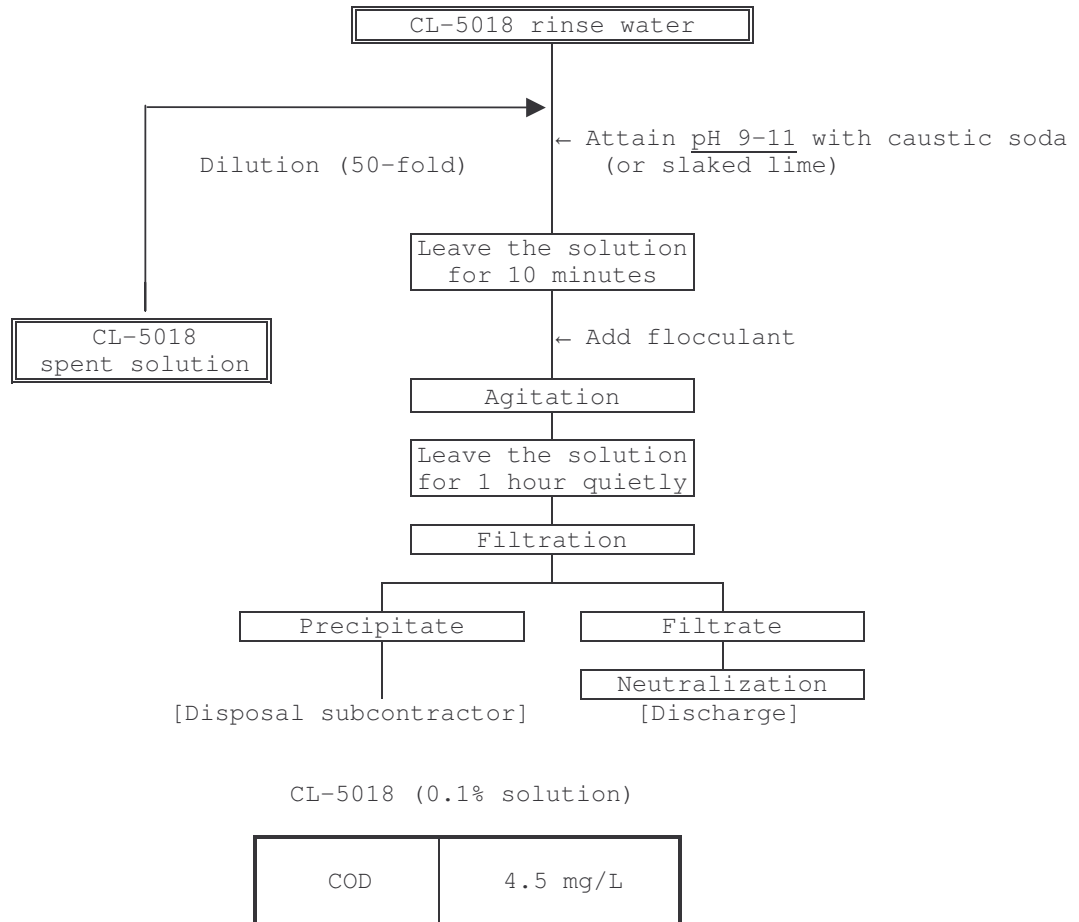


IX. WASTE TREATMENT

CL-5018 spent solution and any wastewater must be treated and/or disposed in accordance with all applicable regulations.

The following procedure is provided as a guideline for treating the spent solutions.

It is not permitted to discharge the spent solution without treatment. Treat it according to instructions shown in the following example. Please contact waste disposal subcontractor, or dilute the solution more than 50-fold according to the procedure below. (COD upon discharging is about 90 mg/l.)



X. COMPATIBLE MATERIALS

No.	Material	Judg- ment	No.	Material	Judg- ment
1	SS 304/316	o	8	Soft EPT	x
2	Titanium	o	9	Soft PVC	x
3	Rigid PVC	o	10	Soft Thermorun	□
4	Rigid PP	o	11	Foamed polymer	x
5	Rigid PE	o	12	SS welding materials	x
6	Rigid Ulmoler/PE type resin	o	13	Titanium welding materials	o
7	Rigid PPE	o			

o: Can be used x: Can not be used □: Consult to MEC COMPANY

NOTE: SS can be used for shafts. Use titanium for heaters and welded sections.

XI. CAUTIONS

[Operation]

Do not drag-in sulfuric ion in OSP chamber.

[Maintenance]

It is recommended to replace the whole Solution and clean the equipment every 6 months in order to maintain stable solution quality.

[Storage]

Sedimentation or precipitation of effective elements of MECSEAL may occur due to freezing or solution temperature drop during storage resulting in reduction of concentration of effective element and abnormal board surface appearance. Take due care of storage environments.

XII. HANDLING PRECAUTIONS/FIRST AIDS

1. Handling precautions

- 1) Provide adequate ventilation in the working area.
- 2) Do not leak CL-5018 when taking it in/out to/from the container.
- 3) When handling CL-5018, take due care so that it may not splash to hands and feet, skin and especially eyes. Use appropriate protection gears such as protection gloves or goggles.
- 4) Wash hands and mouth after handling it.
- 5) Keep containers closed tightly and store them in a cool place away from direct sunshine.
- 6) Absorb spill with dry sand or earth to remove it thoroughly.

2. First aid

- 1) SKIN
Immediately flush exposed area with soap and a large amount of water until it is completely removed. When appearance is changed or you have a sustained pain, consult a physician.
- 2) EYES
Immediately flush eyes with plenty of clean water for at least 15 minutes and then consult an eye specialist.

- 3) INHALLATION
 Immediately move a victim to a place with fresh air.
 Consult a physician depending upon conditions.
- 4) INGESTION
 Give plenty of water and consult a physician immediately.

XIII. PACKAGING

MECSEAL CL-5018 is available in 25 L, 60 Land 200 L polyethylene drums.and 1000 L containers.

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