

SOM-A

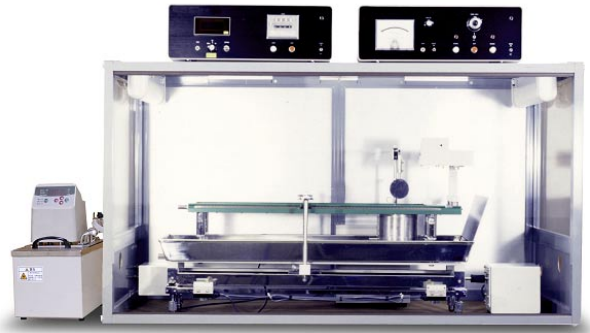
Automatic Spread Oil Measuring Apparatus



■ Automatic Spread Oil Measuring Apparatus SOM-A

In the production line of rolled steel sheet, antirust oil coating process such as DOS, ATBC is available and the quality control of the spread oil volume is performed.

This system measures precisely that small amount of oil coated on rolled steels with the technique called “Hydrophil Balance method” that adopts the typical characteristics of oil spreading over water. This apparatus is also used for the same purpose for the Aluminum sheets.



- ◆ Small oil volume in the range of μg on a test piece can be measured.
- ◆ The Surface Film Pressure to determine oil volume is detected automatically.
- ◆ Wilhelmy Plate method is used for precise results and simple cleaning.
- ◆ Oil volume can be directly read on LED. The unit mg/M^3 or g/BB is optionally selected.
- ◆ Using the Teflon Coated Trough allows easy cleaning and corrosion resistance.
- ◆ Periodical calibration of balancing system can be done by user.
- ◆ Temperature control system prevents the results from affecting by surrounding temp.

■ Partial List of Users

Japan:

Nippon Steel Corporation / JFE Steel Corporation / Kobe Steel Ltd. / Furukawa Electric Co., Ltd. / Furukawa-Sky Aluminum Corp. / Showa Aluminum Corp. / Toyo Seikan Kaisha, Ltd. / Toyo Kohan Co.,

Overseas:

Ton Yi Industrial Corp. (Taiwan) / China Steel Corp. (Taiwan) / Pohang Steel Corp. (Korea) / Shin-Hwa Silup Co., Ltd. (Korea) / Perstima Tin Plate Sdn Bhd (Malaysia, Vietnam) / Baoshan Iron & Steel Co., Ltd. (China) / Siderar S.A.I.C. (Argentina) / Eregli Iron & Steel Works, Inc. (Turkey)

■ Principle

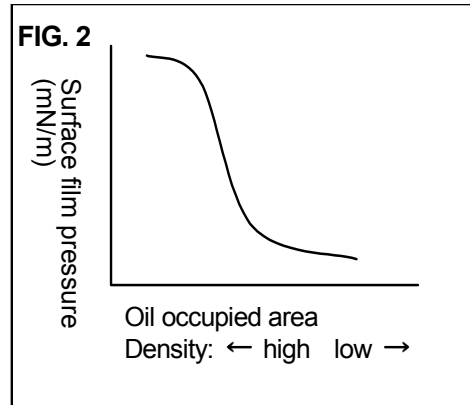
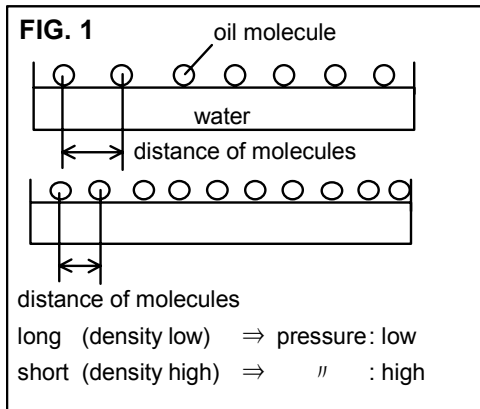
Most oils have property to spread over the water in monolayer status if the area is large enough for oils to spread freely. The area that oil spreads should be in proportion to the oil volume (numbers of oil molecules), if the density of the oil molecules per unit area is kept evenly.

Therefore, if we can control the density of oil molecules when the oil spreads over the water, we can know the oil volume from the spread area and experimental results obtained beforehand about their relations.

How the even density of oil molecules can be controlled?

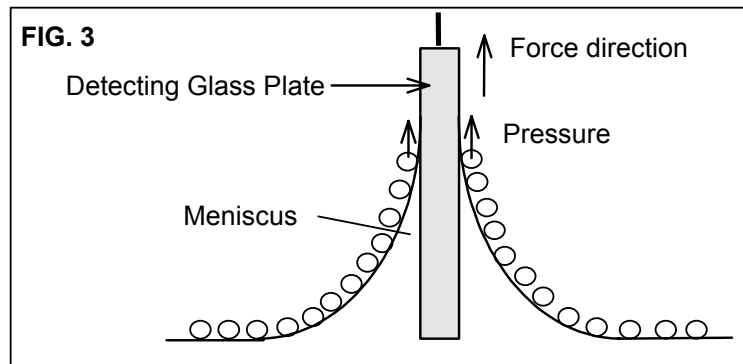
Oil molecules raise pressure when the distance of each molecule becomes close. It is called Surface Film Pressure and that is why the oil molecules spread over the water in monolayer status. (See Fig.1.) And the relation between the oil spread area and the surface film pressure indicates a constant curve as the graph of Fig.2.

By specifying the Surface Film Pressure, even density of oil molecules can be controlled. Normally the SOM-A sets up the Pressure at 8 mN/m which is called Torque Angle.



How to measure the Surface Film Pressure?

When the bottom of detecting glass plate is immersed in the sub phase water, a meniscus (a phenomena of water wetting up to the plate surface) is formed as shown in the Fig.3. The oil molecules spread over water are arranged on the water surface and have pressures each other. The pressure gets the glass plate to bring upward, which can be detected by the precise balance.



Specifications

<Main Unit>

| | |
|-----------------|---|
| Electric Rating | AC100V Single Phase, 50/60Hz, 1.6kVA |
| Dimensions | 1300 (W) × 650 (D) × 860 (H)mm (excluding Hot water circulator) |

We recommend using purified water as filling water. (In case of using running water; Flow rate not smaller than 1L/min. Water tap with a certain level pressure, Tap diameter φ15 to φ15.5).

*Salt water cannot be used on this standard system.

<Components>

Oil Volume Meter (Operation Box B)

For display of measured oil volume and operation of automatic sample washing/spreading unit.

[Feature] Three (3) kinds of oil can be set.

| | |
|----------------------|---|
| Measuring range | 0.3~17.5mg/m ² or 0.005~0.350g/bb *1 |
| Digit & Resolution | 00.1mg/m ² or 0.001g/BB |
| Display method | LED digital display |
| Measurement accuracy | ±2%FS on 35 basis |

*1 In case of measuring both faces using a specimen size 57.3mm and DOS oil. The oil volume on the specimen must be within the range 0.7~50.0 μg.

Automatic Surface Film Pressure Meter (Operation Box-A & Detecting section)

It is composed of an operation box and a detecting unit equipped on the trough to measure Surface Film Pressure, set up Torque Angle, and control Film Pressure Compressing Unit.

| | |
|----------------------|--------------------------|
| Measuring method | Wilhelmy Plate method |
| Measuring range | 0~50.0mN/m (Angle meter) |
| Measurement accuracy | ±0.5%FS |

Oil Film Spreading Trough

It is a trough to pour subphase water and spread oil on a test specimen.

[Feature] Teflon coating is provided on wetted part so as to have an excellent water-repellency.

Jacket system for circulating hot water is modified inside of the Trough body.

Four level adjustment stands are equipped.

| | |
|-----------------------|--------------------------|
| Inside dimensions | 700(L) × 140(W) × 6(D)mm |
| Cylinder section size | 90 × 90(D)mm *2 |

Film Pressure Compressing Unit & Drain Pan (with Drive Motor)

It is equipment composed of drive unit and drain pan to move the Barrier for compressing the area of spread oil

| | |
|-------------------|-----------------------------|
| Compressing speed | 300mm/min |
| Dimension | 1120(W) × 280(D) × 220(H)mm |

Automatic Sample Washing/Spreading Unit

It is an equipment to hold the test specimen and dip it into the subphase water repeatedly by up/down motion for transferring the oil on the specimen into the subphase water.

Hot Water Circulator

It is an equipment to control temp hot water. Both the constant temp water to circulate the Trough and the subphase water are supplied by this equipment.

| | |
|---------------------|--|
| Temperature range | Room temp.+5 ~95 |
| Accuracy | ±0.05~ |
| Control system | PID, SSR output |
| Safety devices | Alarm (Low water level, Overshooting, Control, Sensor) Protector (High temp. prevention, Circuit protector) |
| Heater device | 1kW (SUS316L) |
| Bath capacity | 5.5L |
| Circulate capacity | Max.5L/min |
| Tube inlet/outlet | 10.5 |
| External dimensions | 194(W) × 306(D) × 359(H)mm |
| Power consumption | 1.1kva |

Environmental Chamber

It is a case to guard the apparatus and of wind/dust resistant type. Metal frame, open/close type four glass plates in front comprise the case, and a couple of fluorescent light is equipped on.

| | |
|--------------------|-----------------------------|
| External dimension | 1300(W) × 650(D) × 700(H)mm |
|--------------------|-----------------------------|

Standard Accessories

| | | |
|--------------------------|-------------------------------|--------------------|
| Teflon Coated Barrier | 2pcs as STD use | 2pcs as spare |
| Micro-syringe 250 μ L | 1pce as STD use | 2pcs as spare |
| Detecting Glass Plate | 1pce as STD use | 14pcs as spare |
| Calibration weight 200mg | 1pce as STD use | 1pce as spare |
| Tubes | 15 × 5m (pressure vinyl tube) | 10 × 10m (silicon) |

*The specifications and designs are subject to change without notice.

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<http://www.face-kyowa.com>

Kyowa Interface Science Co., Ltd.

5-4-41 Nobitome, Niiza-City, Saitama 352-0011, Japan

Tel.+81-48-483-2629 Fax.+81-48-483-2702