RUSKIN

Air Quality Solutions

Installation & Maintenance Manual

Model: AMS

Air Measuring Station

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! WARNING

READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THIS DEVICE.

THIS ACCESSORY IS TO BE INSTALLED BY A QUALIFIED SERVICE TECHNICIAN. TO AVOID UNSATISFACTORY OPERATION OR DAMAGE TO THE PRODUCT AND POSSIBLE UNSAFE CONDITIONS, INCLUDING ELECTRICAL SHOCK AND FIRE, THE INSTALLATION INSTRUCTIONS PROVIDED WITH THIS ACCESSORY MUST BE STRICTLY FOLLOWED AND THE PARTS SUPPLIED USED WITHOUT SUBSTITUTION. DAMAGE TO THE PRODUCT RESULTING FROM NOT FOLLOWING THE INSTRUCTIONS OR USING UNAUTHORIZED PARTS MAY BE EXCLUDED FROM THE MANUFACTURER'S WARRANTY COVERAGE.

! WARNING

DISCONNECT ELECTRICAL POWER PRIOR TO SERVICING THIS UNIT. FAILURE TO DO SO CAN RESULT IN ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

Product Application

The Air Measuring Station (AMS) is designed to be used in any application that requires accurate airflow measurement at velocities between 300 and 5,000 feet per minute (1.5 and 25 m/s). Unit may be installed in the duct or in an air handling unit and can be used to measure outside air, return air, discharge air or exhaust air flows into or out of a building or air handling unit.

Key Features

- Licensed to bear the AMCA Certified Ratings Seal for Airflow Measurement Station Performance
- Combines Ruskin's exclusive anodized aluminum step sensor with a 3" (76mm) deep 3000 series aluminum honeycomb air straightener for accurate measurement to maximize performance and offer repeatable and accurate results.
- Velocity Pressure with Dead-Head transducer.
- Field selectable pressure ranges for greatest measurement resolution.

Key Benefits

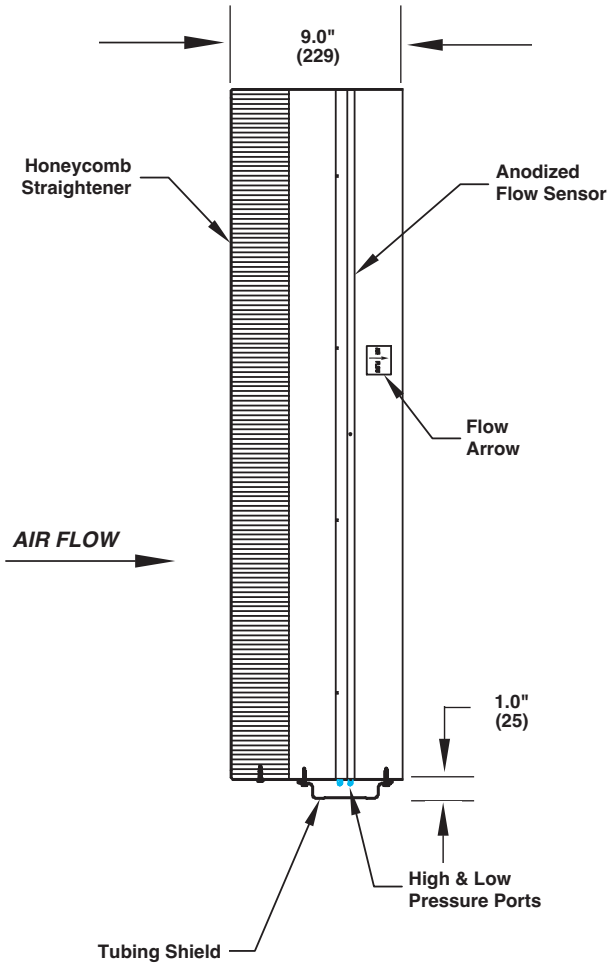
- Contributes to earning required Indoor Environmental Quality (EQ) and Energy and Atmosphere (EA) LEED prerequisites.
- Save energy dollars by measuring the minimum ventilation airflow.
- Meet International Building Code (IBC) and International Energy Conservation Code (IECC) requirements.
- Maintain proper ventilation to dissipate dangerous indoor contaminants such as mold spores, bacteria and chemicals.
- Create a healthy indoor environment to reduce absenteeism, increase productivity, improve comfort and reduce the risk of litigation

Construction Detail

The AMS is an air measuring device that uses pressure across a series of step sensor blades to measure air flow. The step sensor blades are rugged anodized aluminum extrusion with holes arranged to pick up the average total and staic pressures in the system. Total and Static pressure points are piped to a pressure transducer* with an internal glass-on-silicone GL-Si capacitance sensor that is accurate to 1% of full scale.

The AMS air measuring device is available with optional front flange, rear flange, double (front and rear) flange or offset flange.

Refer to the sequence of operation section on page 6 of this document for further details.



Installation

Please verify that you have received everything noted on the packing slip prior to proceeding with the installation.

Remove the AMS from its shipping container and inspect for damage, rust or corrosion. Care must be taken in handling the unit. Always handle the AMS by its frame. Do not drop, drag, step on or apply excessive bending, twisting, or racking loads to the AMS. Special care should be used to protect the honeycomb staightener. Slight cosmetic damage to the air straightener may occur in shipment and will not effect air measurement performance. Simply straighten with long nose pliers if necessary to allow air to pass freely through the straightener.

1. Inspect the duct work and/or opening where the AMS assembly will be installed. If it is to be installed in ductwork, the ductwork should be supported at the area of the AMS to prevent sagging due to the unit's weight.

2. The AMS must be installed with the frame square and without twisting or bending.

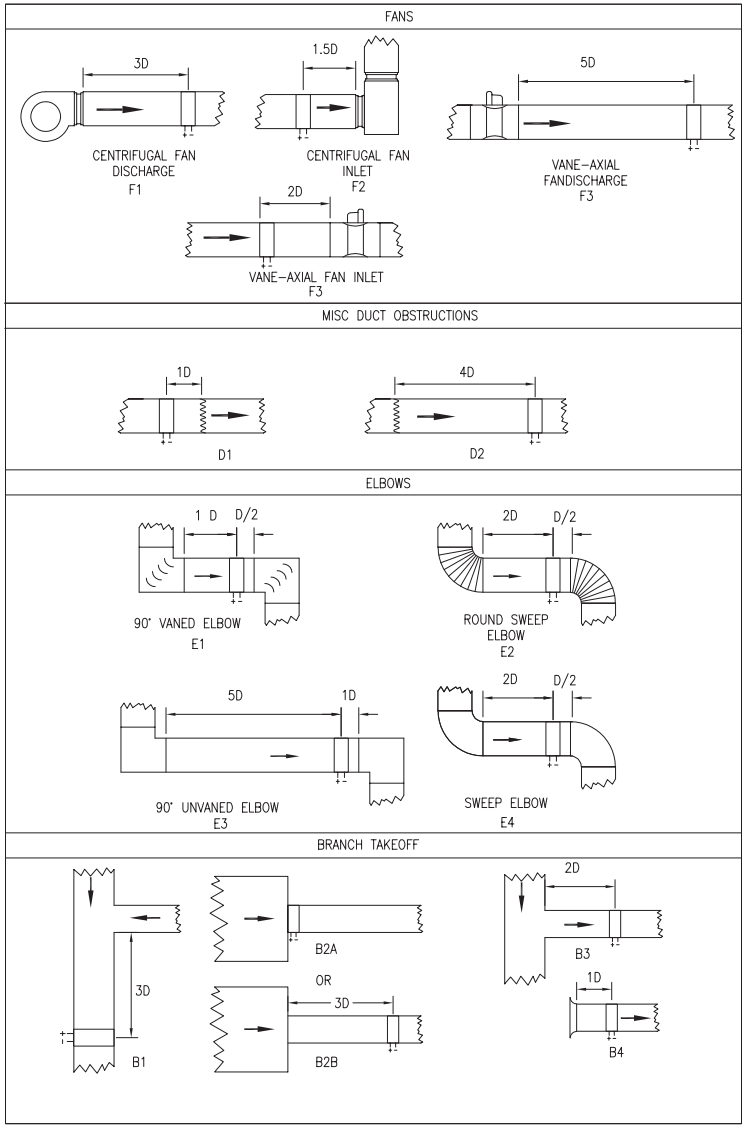
3. The AMS has a specified inlet and outlet. The outside air (or other controlled air stream) enters the unit through the air straightening section.

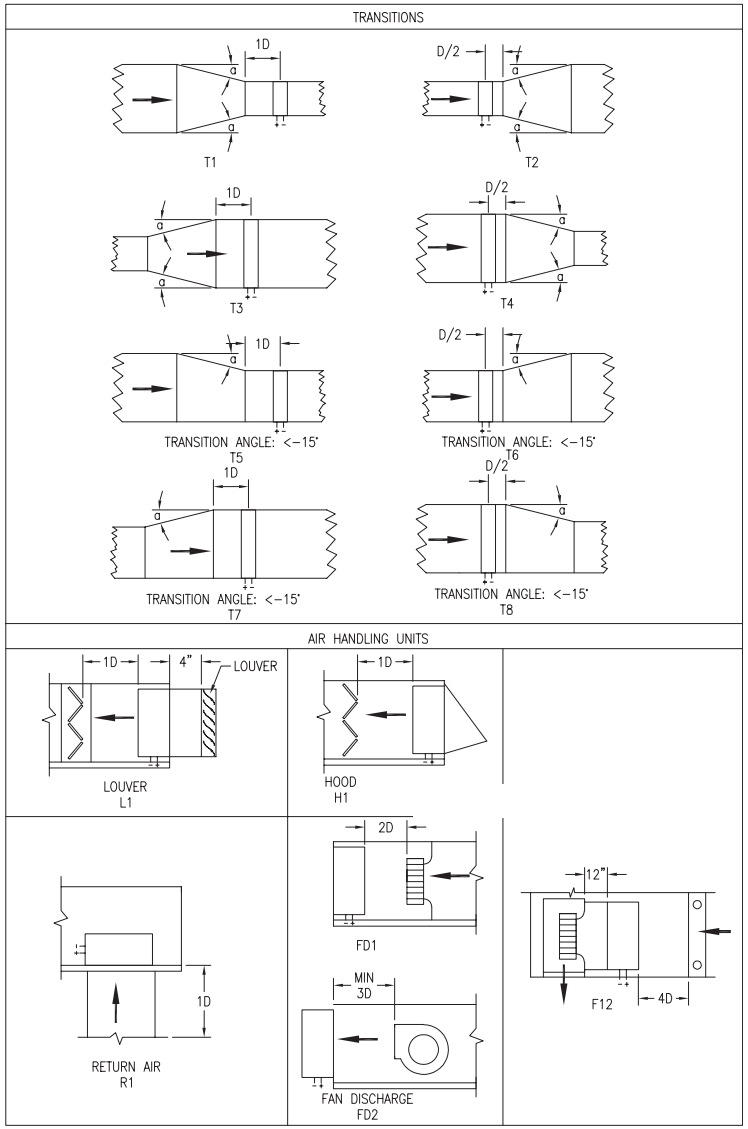
4. Use appropriate shims between the damper frame and ducts opening to prevent distortion of the frame by fasteners holding it in place. If creating a multi-section assembly, be sure that all the sections are fastened together on both sides.

5. After installing the assembly in the ductwork or moutning hole, caulk around the frame to prevent leakage or bypass air around the air measuring station.

6. Refer to page 4 for acceptable application specific air measuring product placement options. Consult your local representative with questions about placement.

Air Measurement Station Placements for Acceptable Installations





1D EQUIVALENT CHART

DUCT HEIGHT	DUCT WIDTH																												
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
6	6.8	7.8	8.7	9.6	10	11	12	12	13	14	14	15	15	16	16	17	17	17	18	18	19	19	20	20	20	21	21	21
8	7.8	9	10	11	12	13	14	14	15	16	16	17	17	18	19	19	20	20	21	21	22	22	23	23	23	24	24	25
10	8.7	10	11	12	13	14	15	16	17	17	18	19	20	20	21	21	22	23	23	24	24	25	25	26	26	27	27	28
12	9.6	11	12	14	15	16	17	17	18	19	20	21	21	22	23	23	24	25	25	26	27	27	28	28	29	29	30	30
14	10	12	13	15	16	17	18	19	20	21	22	22	23	24	25	25	26	27	27	28	29	29	30	30	31	32	32	33
16	11	13	14	16	17	18	19	20	21	22	23	24	25	26	26	27	28	29	29	30	31	31	32	33	33	34	34	35
18	12	14	15	17	18	19	20	21	22	23	24	25	26	27	28	29	30	30	31	32	32	33	34	35	35	36	36	37
20	12	14	16	17	19	20	21	23	24	25	26	27	28	29	29	30	31	32	33	33	34	35	36	36	37	38	38	39
22	13	15	17	18	20	21	22	24	25	26	27	28	29	30	31	32	33	33	34	35	36	37	37	38	39	40	40	41
24	14	16	17	19	21	22	23	25	26	27	28	29	30	31	32	33	34	35	36	37	37	38	39	40	41	41	42	43
26	14	16	18	20	22	23	24	26	27	28	29	30	32	33	34	35	35	36	37	38	39	40	41	41	42	43	44	45
28	15	17	19	21	22	24	25	27	28	29	30	32	33	34	35	36	37	38	39	40	40	41	42	43	44	45	45	46
30	15	17	20	21	23	25	26	28	29	30	32	33	34	35	36	37	38	39	40	41	42	43	44	45	45	46	47	48
32	16	18	20	22	24	26	27	29	30	31	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	49
34	16	19	21	23	25	26	28	29	31	32	34	35	36	37	38	39	41	42	43	44	45	46	47	47	48	49	50	51
36	17	19	21	23	25	27	29	30	32	33	35	36	37	38	39	41	42	43	44	45	46	47	48	49	50	51	52	52
38	17	20	22	24	26	28	30	31	33	34	35	37	38	39	41	42	43	44	45	46	47	48	49	50	51	52	53	54
40	17	20	23	25	27	29	30	32	33	35	36	38	39	40	42	43	44	45	46	47	48	49	50	51	52	53	54	55
42	18	21	23	25	27	29	31	33	34	36	37	39	40	41	43	44	45	46	47	49	50	51	52	53	54	55	56	57
44	18	21	24	26	28	30	32	33	35	37	38	40	41	42	44	45	46	47	49	50	51	52	53	54	55	56	57	58
46	19	22	24	27	29	31	32	34	36	37	39	40	42	43	45	46	47	48	50	51	52	53	54	55	56	57	58	59
48	19	22	25	27	29	31	33	35	37	38	40	41	43	44	46	47	48	49	51	52	53	54	55	56	57	59	60	61
50	20	23	25	28	30	32	34	36	37	39	41	42	44	45	47	48	49	50	52	53	54	55	56	58	59	60	61	62
52	20	23	26	28	30	33	35	36	38	40	41	43	45	46	47	49	50	51	53	54	55	56	58	59	60	61	62	63
54	20	23	26	29	31	33	35	37	39	41	42	44	45	47	48	50	51	52	54	55	56	57	59	60	61	62	63	64
56	21	24	27	29	32	34	36	38	40	41	43	45	46	48	49	51	52	53	55	56	57	59	60	61	62	63	64	65
58	21	24	27	30	32	34	36	38	40	42	44	45	47	49	50	52	53	54	56	57	58	60	61	62	63	64	65	67
60	21	25	28	30	33	35	37	39	41	43	45	46	48	49	51	52	54	55	57	58	59	61	62	63	64	65	67	68

To determine the placement of an air measuring station that is located down stream of a 90º vaned elbow (as shown in the detail E1 above); follow the duct width down to the duct height. The number at this intersection represents distance in inches (1D).

Example 1
The 1D Equivalent of a 20” x 10” duct = 16”

Example 2
The same 20” x 10” duct installed as shown in detail E3 would be 16” x 5 (5D)

Notes:
1. All numbers are expressed in inches.
2. 2D = 1D x 2, 3D = 1D x 3, etc.
3. Equivalent round duct diameter = SQRT ([4 x H x W] ÷ 3.1416)

Sequence of Operation

BAS Control

The unit is installed and furnished with an RU274R2VDC transducer. Under flow, the transducer output produces a voltage signal to the Building Automation System (BAS). The BAS calculates CFM based on the velocity pressure. CFM can be checked by referencing the chart or by utilizing the formula below. Both Ka and 1/m values are constants that may change based on the size of the air measurement station.

The formula provided on the PAMS (Pressure Across Measuring Station) chart must be applied to convert the velocity pressure output from the low-pressure transducer into a CFM value. Each unit is provided with a PAMS chart developed specifically for that unit. Applying other formulas may result in greater air measurement error and unacceptable results.

$$CFM=(AREA * Ka) * PAMS^{(l/m)}$$

RUSKIN
AUTHORITY IN AIR CONTROL

SOLD TO: *Ruskin Customer*
CONTROL NO: *1234567*
TAG: *Unit 1*
MODEL: *AMS*

Actual Damper Size (inches)	
Damper Width	48
Damper Height	73
Number Probes	4
Damper Sections	1

Ka	3047.4
1/m	0.5222
Area x Ka =	70730.154
Area =	23.21

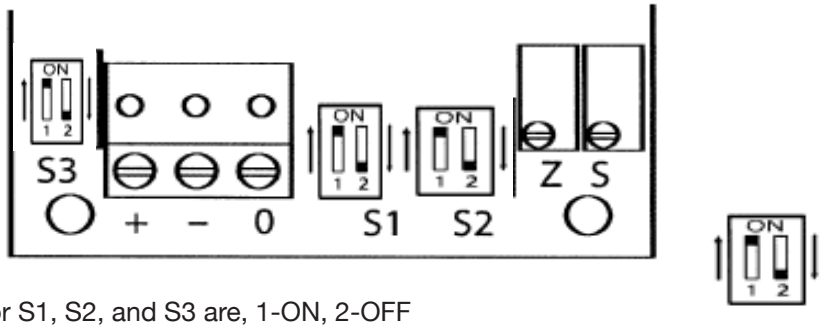
CFM = (AREA * Ka) * PAMS$^{(1/m)}$

PAMS*	CFM	FPM
0.005	4,446	192
0.01	6,386	275
0.02	9,171	395
0.03	11,333	488
0.04	13,170	567
0.05	14,798	638
0.06	16,276	701
0.07	17,641	760
0.08	18,915	815
0.09	20,115	867
0.10	21,252	916
0.11	22,337	962
0.12	23,375	1,007
0.13	24,373	1,050
0.14	25,335	1,092
0.15	26,264	1,132
0.20	30,521	1,315
0.30	37,719	1,625
0.40	43,833	1,889
0.50	49,250	2,122
0.60	54,170	2,334
0.70	58,710	2,530
0.80	62,950	2,712
0.90	66,944	2,884
1.00	70,730	3,047

***PAMS = Pressure Across Measuring Station**

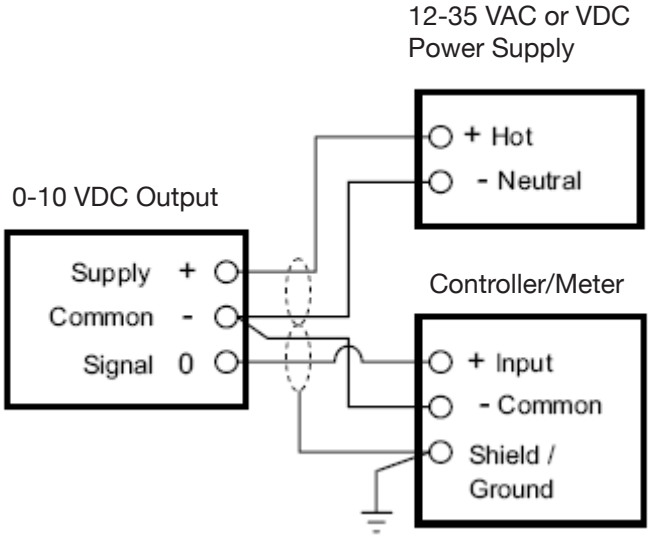
NOTE:
CFM CORRECTED TO 70° F. & 1000 FT ELEVATION.
FOR OTHER ELEVATIONS ADD 2% PER 1000 FT. INCREASE
ADD 1% PER 10° F INCREASE IN TEMP.
RECOMMENDED OPERATING RANGE IS 300 TO 2000 FPM.
OPERATION OUTSIDE THE OPERATING RANGE IS NOT RECOMMENDED

Standard RU-274-R2-VDC Transducer Dip Switch Settings and Wiring Details



The Default Settings for S1, S2, and S3 are, 1-ON, 2-OFF
For other settings and pressure ranges see table below, or consult transducer product data sheet

Range Configuration - Uni-directional Switch - S1	
R2 0-1.0” wc/250 pa (default)	
0-0.5” wc/125 pa	
0-0.25” wc/62.5 pa	



Follow the steps below to set up the standard RU-274-R2-VDC low-pressure transducer. The settings are shown above for a 0-10VDC output and a 0-1.0 inwc pressure range. For the greatest air measurement resolution, use the lowest pressure range that will work for the maximum airflow expected. Normal power source is 24VAC however 12 to 40VDC or 12 to 35VAC are also acceptable.

1. The terminal block can be wired by carefully unplugging it from the circuit board.
2. Locate the (+) (-) and the (O) terminal markings on the circuit board.
3. Attach the power wires to the respective (+) and (-) terminals. Note: the (-) terminal is also the negative output termination point.
4. Connect the (O) terminal, which is the positive VDC output terminal, to the BAS input.
5. Verify the VDC output with a digital volt meter connected to the (O) and (-) terminals.
6. Voltage output signal and differential pressure range are dipswitch selectable. Reference the installation instructions for the low-pressure transducer for additional information.

Wiring and Piping Connections

The AMS Air Measuring Station will be shipped with a Ruskin low-pressure transducer. The standard transducer is a Ruskin RU-274-R2-VDC and is factory configured for 0-1.0 inwc (0-249 Pa) corresponding to a 0-10VDC output. The transducer requires a power source of either 12-40VDC or 12-35VAC. Connect pressure tubing from the transducer to the airflow sensing blade, connecting the low pressure port to the static pressure side nearest the air exiting side and the high pressure port to the blade side facing the air entering side. Optional transducers with LCD displays or 0-20mA output are also available.

AMS STANDARD CONSTRUCTION

SLEEVE
9" (229) long x 16 ga. (1.6) galv. G60 (for slip-fit duct connection).

AIR FLOW STRAIGHTENER
.50" (13) Honeycomb Cell x 3" (76) 3000 series aluminum alloy.

SENSOR BLADE
6063T6 extruded aluminum, clear anodize finish.

SENSOR PORT FITTINGS
Brass.

ACCURACY
3% deviation average across measurement range.

OPERATING TEMPERATURE
-22° F to +140° F standard (-30°C to 60°C).

VELOCITY
Product Range - 300 to 5000 FPM (1.5 to 25 m/s).
Operating Range - 300 to 2,000 FPM (1.5 to 10.2 m/s).
-Standard units with RU274-R2-VDC (1.5 to 25 m/s).
Operating Range - 300 to 5,000 FPM (1.5 to 25 m/s).
Units with AMS810 high pressure transducer.

MINIMUM SIZE
Single - 6"w x 6"h (152 x 152).

MAXIMUM SIZE
Single section - 60"w x 72"h (1524 x 1829).
Multiple section assembly - 120"w x 72"h (3048 x 1829).

Specifications

RU-274-R2-VDC Transducer (low pressure transducer)

Power	12-40 VDC or 12-35 VAC
Outputs	0-10 VDC (0-5 VDC field selectable) Optional 4-20 mA Order AMS810 Transducer
Enclosure	Painted NEMA 4 (IP-65)
Operating Range	°F to 175°F (-18°C to 80°C)

Maintenance

1. Disconnect the sensing tubes between the damper and the pressure transducer. Apply a clean pressurized air source, less than 10 PSI, to the air piping connections at the AMS frame in order to blow out any condensation or dirt accumulation plugging the sensing ports. **DO NOT connect this air source to the pressure transducer. This will damage the instruments.** Replace tubing to the equipment in reverse order of removal.

2. The air straightener section of the AMS and the air sensing blades should be annually inspected for particulate build-up. Use a damp cloth to wipe clean the sensing blade surface. Water may be used to clean and flush the air straightening section and the sensing blades of the AMS. Using pressurized air for purging the sensing blades of water is recommended.

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