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P U B L I C A T I O N T R A N S M I T T A L

February 26, 2021

TO: Recipients of 250-C18, -C20, -C28, -C30, -C20R, -C40, -C47, -B15, -B17 and -B17F Commercial Service Letters

SUBJECT: CONTAMINATION REMOVAL (WATER RINSE) INSTRUCTIONS
USING WATER ONLY.

This letter transmits Revision 10 to the subject commercial service letters:

<u>Model</u>	<u>Letter Number</u>
250-C18 Series	CSL 141
250-C20 Series	CSL 1135
250-C28 Series	CSL 2082
250-C30 Series	CSL 3085
250-C20R Series	CSL 4018
250-C40 Series	CSL 5017
250-C47 Series	CSL 6004
250-B15 Series	TPCSL 76
250-B17 Series	TPCSL 1095
250-B17F Series	TPCSL 2004

This is a complete revision. Replace the Revision 11 issue with Revision 12.

Revision 12 adds editorial changes.

The following list includes the original issue date and all revisions to this letter:

Original issue	June 23, 1986
Revision 1	February 15, 1988
Revision 2	October 1, 1988
Revision 3	August 1, 1989
Revision 4	June 30, 1992
Revision 5	November 30, 1995
Revision 6	June 30, 1997
Revision 7	February 15, 1998
Revision 8	May 24, 2001
Revision 9	February 17, 2004
Revision 10	August 27, 2004
Revision 11	December 20, 2019
Revision 12	February 26, 2021

CUSTOMER SUPPORT
ROLLS-ROYCE



CONTAMINATION REMOVAL (WATER RINSE) INSTRUCTIONS USING WATER ONLY

- A. Engine components may suffer corrosion and/or erosion induced failures. This Commercial Service Letter (CSL) is a reminder to all operators of the necessity of doing a daily water rinse to all Rolls-Royce M250® Series engines that are flown in a corrosive and/or erosive environment.

WARNING: FAILURE TO PROPERLY FOLLOW THE WATER RINSE PROCEDURES COULD RESULT IN CORROSIVE ATTACK AND ENGINE FAILURE.

- B. Water Rinse Procedure:

WARNING: SALT LADEN HUMIDITY AND CHEMICALS WILL CORRODE THE ENGINE AND COULD CAUSE IT TO FAIL.

Engines subjected to salt water contamination or other chemically laden atmosphere (industrial pollutants, sulfur laden atmosphere, pesticides, herbicides, etc.) shall undergo water rinsing after shutdown following the last flight of the day. Perform the rinse operation as soon as practical after flight, but not before the engine has cooled to near ambient temperature.

NOTE: Operators should be aware that salt or chemically laden air may be encountered for 75-150 miles from the source under certain weather conditions. All islands are considered a severe area. If there is any doubt about the conditions in which your engines are operated, the engines must be given a daily water rinse. Acceptable water will not damage the engine but salt and chemicals will. (See Figures 4-9, Corrosion Severity Maps of the World). Additionally, a particular area may be corrosive because of many factors, including chemically laden atmospheres which are usually confined to a specific location. Rolls-Royce does not specify the extent of chemically laden atmospheres in Figures 4-9, but any location where they are encountered are considered corrosive environments.

- (1) Precautions

CAUTION: BE SURE THE IGNITION CIRCUIT BREAKER IS PULLED TO PREVENT IGNITION DURING THE RINSE CYCLE.

CAUTION: THE PC TUBE FROM THE SCROLL TO THE PC FILTER SHOULD NOT BE REMOVED WHEN PERFORMING THE DAILY WATER RINSE.

- (a) Do not perform the rinse procedure while the engine is operating at idle speed as damage to the compressor will result.
- (b) N₁ speed must not exceed 10% rpm during water spray injection.
- (c) Use the highest quality water available, distilled or demineralized water is recommended.

NOTE: Use of water not meeting electrical conductivity of 20 micromhos per centimeter maximum will require the engine to be inspected per Rolls-Royce CSL 205 "HOT CORROSION - SULFIDATION"

- (d) Do not spray water into a hot engine. The engine temperature is satisfactory for water rinse when the bare hand can be placed on the outer combustion case without discomfort or 60°C (140°F) surface temperature of the OCC..

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- (e) Avoid conditions which would allow the rinse water to freeze.

NOTE: Methyl alcohol may be added to the water to prevent freezing during water rinse in below freezing weather. Mix one part methyl alcohol to one part water. This mixture prevents freezing down to -40°C (-40°F). The methyl alcohol shall contain methanol in concentrations not less than 99.85% by volume.

- (f) Do not inject a solid stream of water into the engine. Use a nozzle which provides a diffused spray pattern.
- (g) A conventional nozzle meeting the flow requirements of para 2, this section, may be used. Center the spray around the bullet nose of the inlet to ensure that all of the spray is injected into the engine. Spray a minimum of one quart into the compressor.

(2) Materials and Equipment:

- (a) The highest quality water available must be used. Distilled or demineralized water is recommended.

The most rapid and economical means to assess water quality is by measuring electrical conductivity. Control of electrical conductivity to a specific low level will automatically yield a low level of chlorides, sulfates, sodium, and other elements. Distilled or demineralized water with a maximum electrical conductivity of 20 micromhos per centimeter is recommended.

NOTE: Most water deionizing equipment has the capability to determine electrical conductivity. Commercially purchased deionized/demineralized water conductivity information should be requested from the vendor.

Should the electrical conductivity of the water not be known, the use of distilled or demineralized water is preferred. However, if water of unknown electrical conductivity is utilized, or if the water does not meet the maximum electrical conductivity of 20 micromhos per centimeter, then the engine must be inspected per CSL 205 "HOT CORROSION - SULFIDATION".

- (b) Portable equipment such as a clean garden sprayer or fire extinguisher which can be pressurized to obtain the required flow rate is recommended for water rinse. To provide capability for rinse with either portable equipment or a water supply system, a nozzle capable of flowing the recommended rate at about 55 psig (379 kPa) is desired.
- (c) The spray nozzle shall provide a diffused spray of water at a flow rate of one quart (1 liter) in nine to eleven seconds at the pressure conditions used during compressor rinse. The nozzle should be sized to provide the proper flow rate at the average pressure maintained during each rinse cycle.

NOTE: Test for proper water flow at the pressure to be used by placing the nozzle in a large container so that no water can splash out. Time the flow for 10 seconds and measure the quantity collected. Proper nozzle size for the pressure used should accumulate 1 to 1-1.125 quarts (0.95 to 1.06 liters). Adjust nozzle size as necessary to meet the specified flow limits.

- (d) A quick opening valve shall be installed in the supply tube as close to the nozzle as practical.

(3) Spray application:

- (a) Retain/select anti-ice valve in the "off" position.
- (b) Pull the engine ignition circuit breaker.

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- (c) Series I and II engines:

Block the bleed valve in the closed position using the wedge in compressor cleaning protector kit (6886204) (Ref. Fig. 1). It is not necessary to disconnect any lines.

- (d) Series III and IV engines:

As a customer option, the bleed valve may be open or closed during the water rinse procedure. If it is to be closed, use the following procedure:

- 1 On double-plumbed bleed valves (23003106), remove the AN 929 cap from the tee-fitting at the bleed valve control solenoid. (Ref. Fig. 2). On single-plumbed bleed valves (prior to 23003106), remove the plug covering the P_c inlet port and insert an AN 815 union in the opening. (Ref. Fig. 3.)
- 2 Close the double-plumbed bleed valve by applying shop air at no more than 100 psi (689 kPa) to the tee-fitting. Close the single-plumbed bleed valve by applying the shop air to the union installed in the P_c inlet port.

NOTE: Some aircraft manufacturers provide an airframe mounted air fitting to assist in pressurizing the bleed valve for the compressor rinse.

If shop air is not available for bleed valve pressurization, and you want to close the bleed valve, the bleed valve must be removed and blanking plate fabricated and installed in its place prior to rinsing the compressor.

CAUTION: TO PREVENT POSSIBLE BLADE DAMAGE AND TO ASSURE ADEQUATE RINSE AT THE BASE OF THE BLADES, N_1 MUST NOT EXCEED 10% RPM. IF N_1 RPM REACHES 10%, RELEASE THE STARTER AND CONTINUE THE WATER SPRAY. PERMIT N_1 RPM TO REDUCE TO APPROXIMATELY 5% AND THEN REENERGIZE THE STARTER TO OBTAIN A FULL TEN SECONDS OF ENGINE ROTATION WHILE WATER IS SPRAYED INTO THE COMPRESSOR.

CAUTION: NEVER PERFORM THE WATER RINSE PROCEDURE WHILE THE ENGINE IS OPERATING; THE COMPRESSOR IMPELLER WILL BE DAMAGED. A MOTORIZED RINSE PROCEDURE UTILIZING THE STARTER WITH N_1 SPEED BELOW 10% IS THE ONLY AUTHORIZED PROCEDURE FOR THE MODEL 250-C28 OR -C30 SERIES ENGINE.

- (e) Spray water into the compressor inlet for 10 seconds while the engine is being motored with the starter. Start the water injection three seconds prior to starter engagement. The three second delay will reduce the tendency of the engine to accelerate above 10% rpm. The spray must flow the water as close to the bullet nose of the compressor inlet as possible to ensure that all of the spray is injected into the engine. Do not flood the engine prior to starter engagement.

NOTE: Observe engine speed during the 10 second rinsing operation. The engine rpm will generally stagnate at or just below 10%; but when using a fully charged battery or an A.P.U., the rpm may tend to exceed 10%.

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250-B15G Series
250-B17 Series
250-B17F Series

CSL -5017
CSL -6004
TP CSL -76
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TP CSL -2004

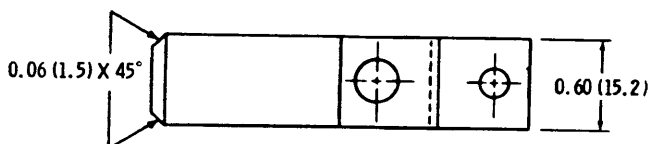
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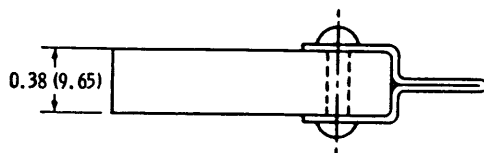
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- (f) Continue injection of water spray during coast down until N_1 stops, this improves the rinse of the base of the blades. Do not continue spray after engine stops.
- (g) Allow engine to drain. Combustion drain valves may be removed to improve rapid draining of the turbine.
- (h) Restore engine to operating configuration:
 - 1 On Series I and II, remove the wedge from the bleed valve.
 - 2 On Series III and IV, remove any installed fitting. Reinstall any removed caps or plugs as may be required (if removed).
 - 3 Reinstall the combustion drain valves (and plumbing) if previously removed.
- (i) Within 15 minutes of the water rinse, operate the engine at idle for five minutes to purge and evaporate all residual water (actuate anti-icing system for one minute).

NOTE: If exposure to excessive salt or other corrosive media has occurred, a repeat to the rinse procedure may be necessary.



Note: Dimensions are in inches (millimetres).



Bleed Valve Wedge
Figure 1

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250-C40 Series
250-C47 Series
250-B15G Series
250-B17 Series
250-B17F Series

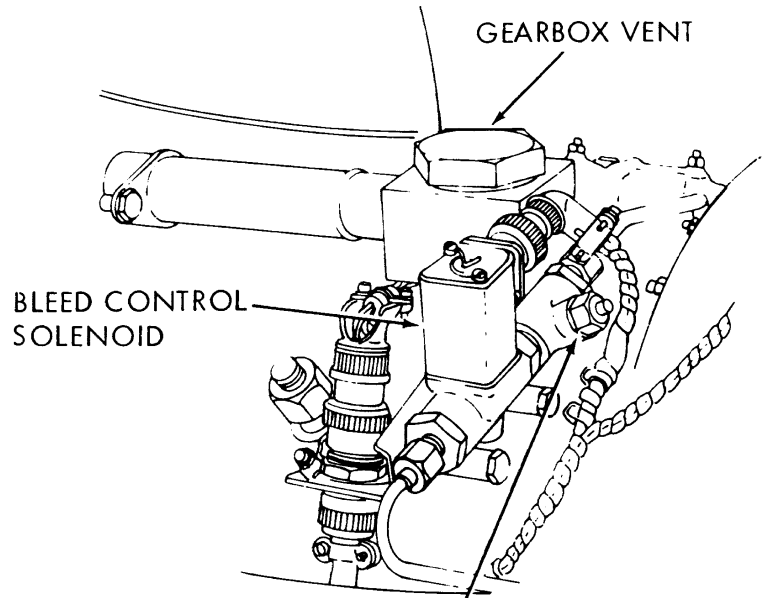
CSL -5017
CSL -6004
TP CSL -76
TP CSL -1095
TP CSL -2004

250-C18 Series
250-C20 Series
250-C28 Series
250-C30 Series
250-C20R Series

CSL -141
CSL -1135
CSL -2082
CSL -3085
CSL -4018

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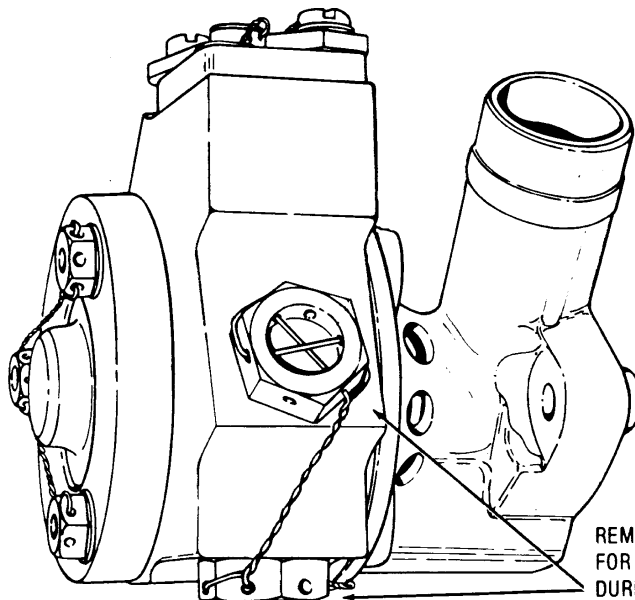
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REMOVE CAP FROM FITTING TO
PRESSURIZE BLEED VALVE

19798

Bleed Control Solenoid and Tee-fitting (Double Plumbed)
Figure 2



REMOVE ONE OF THESE PLUGS
FOR PRESSURIZING BLEED VALVE
DURING COMPRESSOR RINSE

Bleed Valve (Single Plumbed)
Figure 3

16913A

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250-C20 Series
250-C28 Series
250-C30 Series
250-C20R Series

CSL -141
CSL -1135
CSL -2082
CSL -3085
CSL -4018

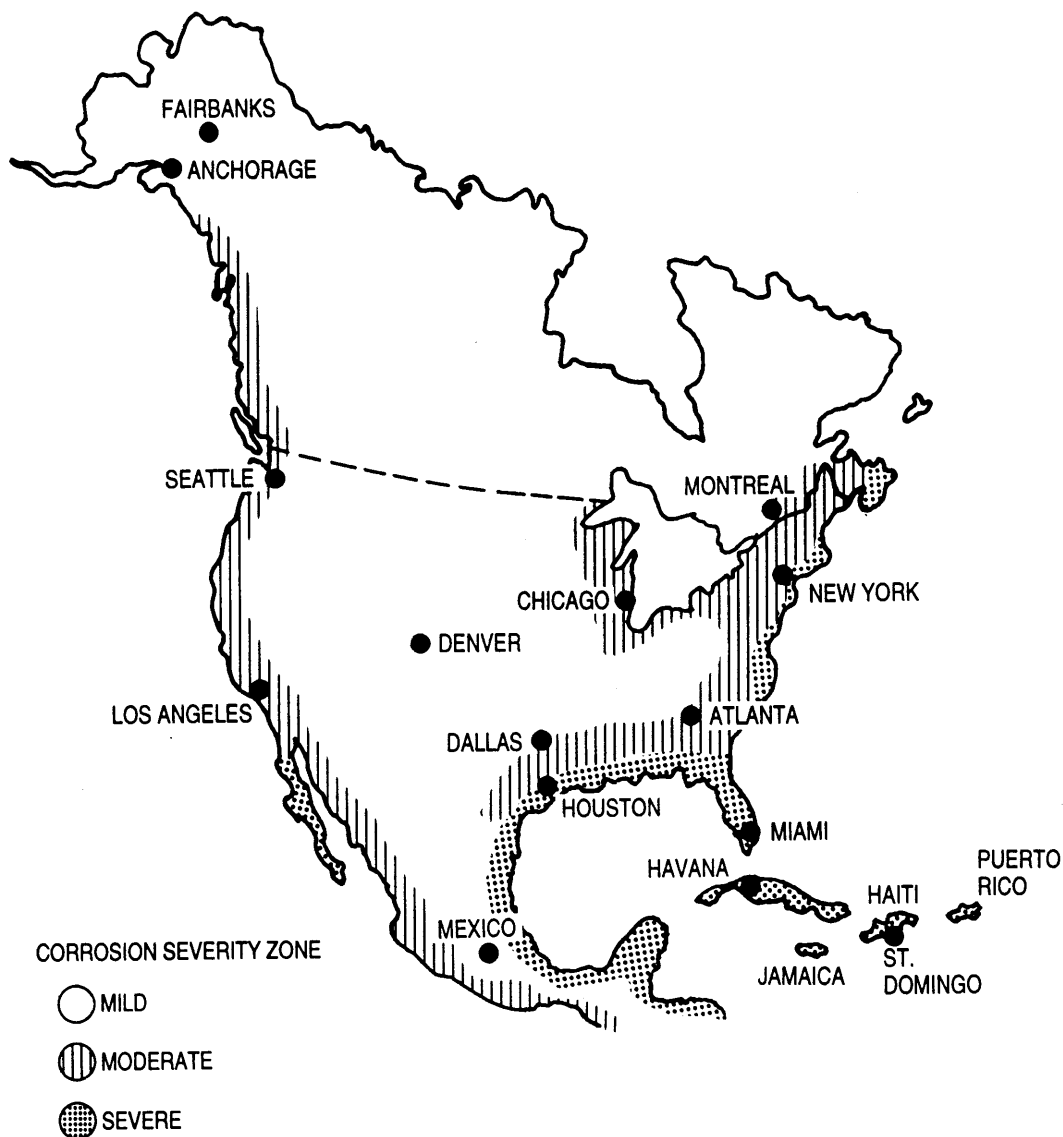
250-C40 Series
250-C47 Series
250-B15G Series
250-B17 Series
250-B17F Series

CSL-5017
CSL-6004
TP CSL -76
TP CSL -1095
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Note: All islands are considered severe conditions.

Note: Corrosion map is not exhaustive. Industrial atmospheres contain many contaminants which are usually confined to a specific location.

North America Corrosion Severity Map
Figure 4

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250-C40 Series
250-C47 Series
250-B15G Series
250-B17 Series
250-B17F Series

CSL -5017
CSL -6004
TP CSL -76
TP CSL -1095
TP CSL -2004

250-C18 Series
250-C20 Series
250-C28 Series
250-C30 Series
250-C20R Series

CSL -141
CSL -1135
CSL -2082
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Note: Corrosion map is not exhaustive. Industrial atmospheres contain many contaminants which are usually confined to a specific location.

South America Corrosion Severity
Figure 5

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250-C18 Series
250-C20 Series
250-C28 Series
250-C30 Series
250-C20R Series

CSL -141
CSL -1135
CSL-2082
CSL-3085
CSL-4018

250-C40 Series
250-C47 Series
250-B15G Series
250-B17 Series
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CSL-5017
CSL-6004
TP CSL -76
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Note: Corrosion map is not exhaustive. Industrial atmospheres contain many contaminants which are usually confined to a specific location.

Africa Corrosion Severity Map
Figure 6

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250-C40 Series
250-C47 Series
250-B15G Series
250-B17 Series
250-B17F Series

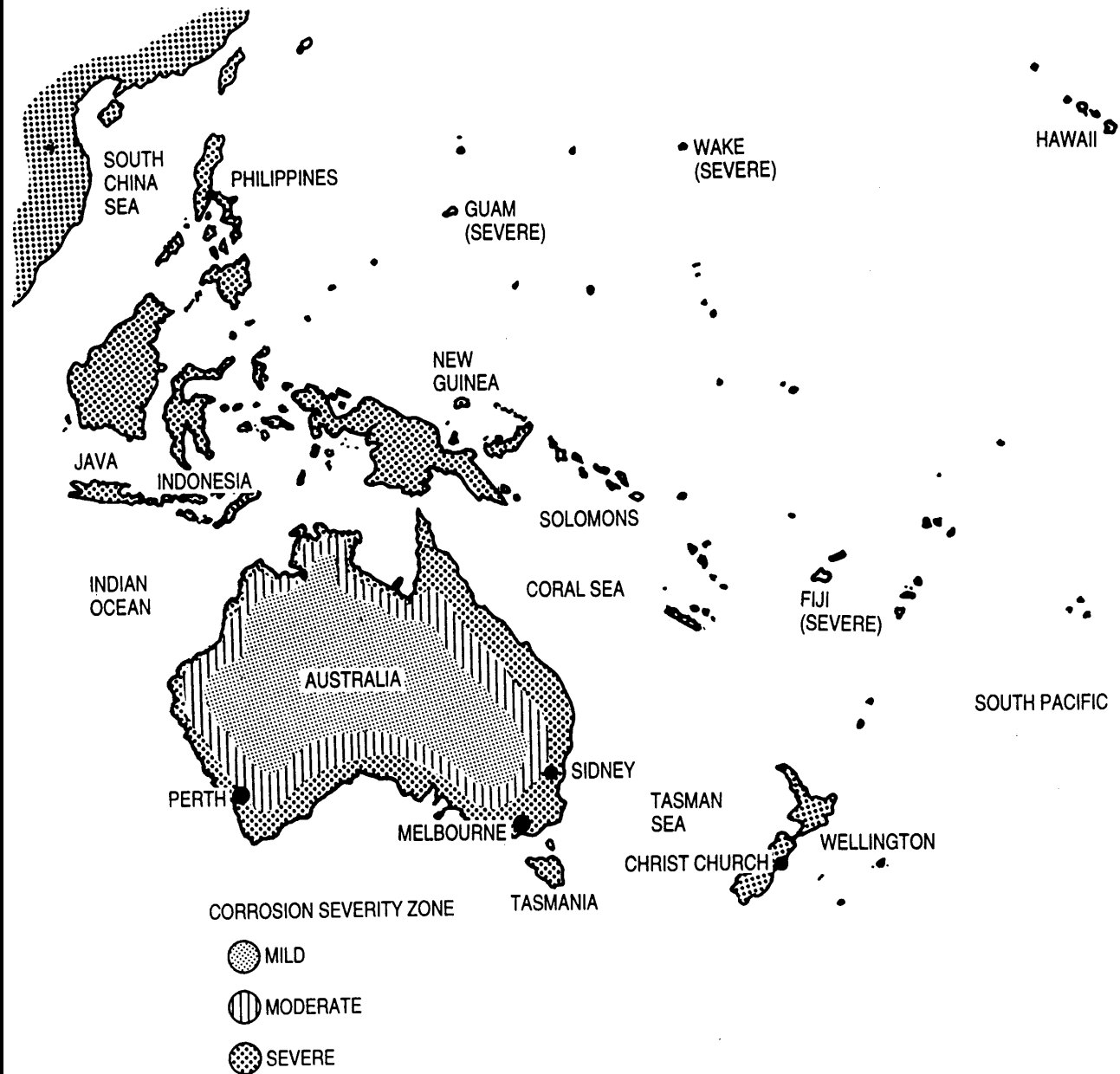
CSL -5017
CSL -6004
TP CSL -76
TP CSL -1095
TP CSL -2004

250-C18 Series
250-C20 Series
250-C28 Series
250-C30 Series
250-C20R Series

CSL -141
CSL -1135
CSL -2082
CSL -3085
CSL -4018

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Note: All islands are considered severe conditions.

Note: Corrosion map is not exhaustive. Industrial atmospheres contain many contaminants which are usually confined to a specific location.

South Pacific Corrosion Severity Map
Figure 7

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250-C18 Series
250-C20 Series
250-C28 Series
250-C30 Series
250-C20R Series

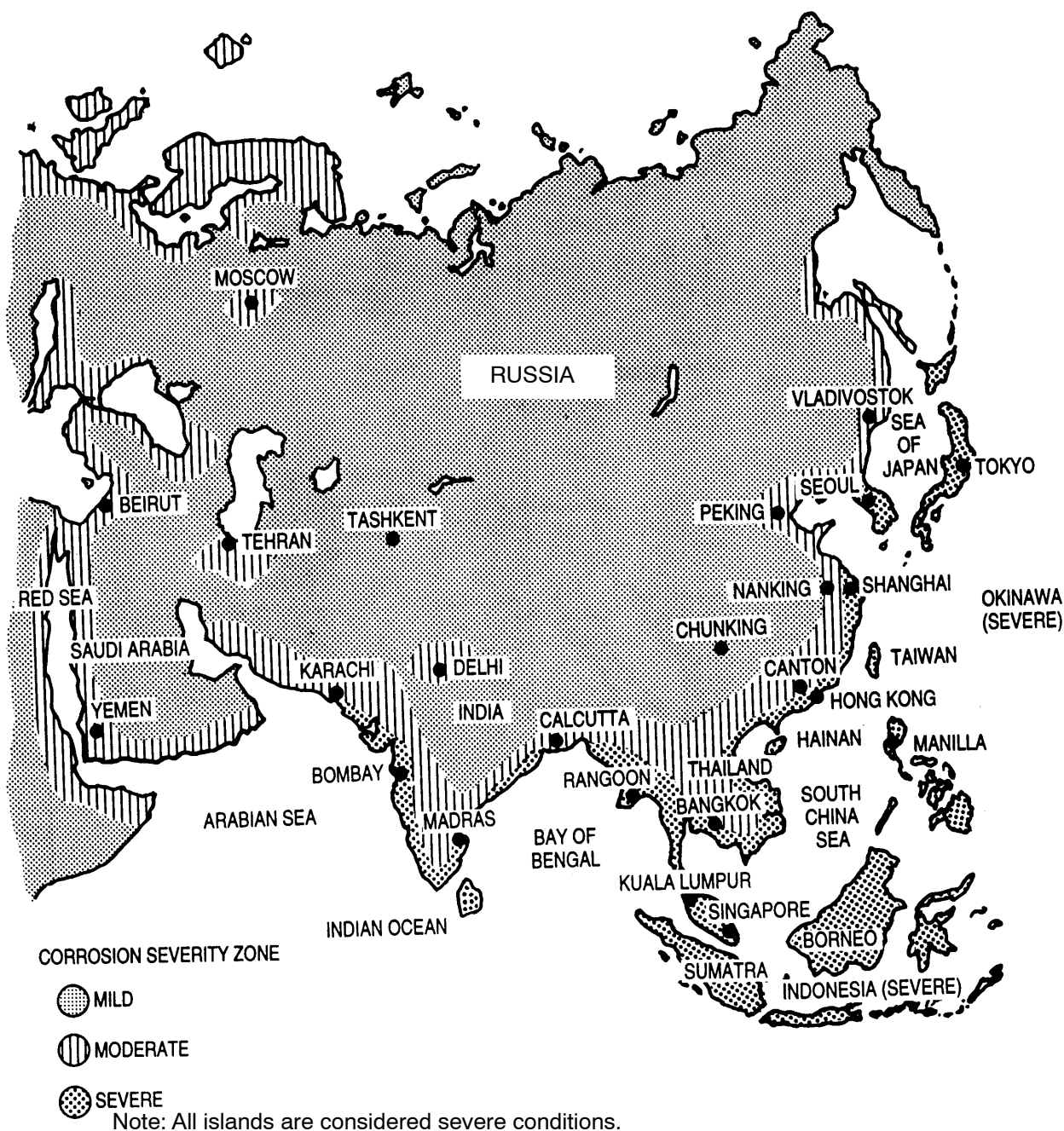
CSL -141
CSL -1135
CSL -2082
CSL -3085
CSL -4018

250-C40 Series
250-C47 Series
250-B15G Series
250-B17 Series
250-B17F Series

CSL-5017
CSL-6004
TP CSL -76
TP CSL-1095
TP CSL-2004

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Note: Corrosion map is not exhaustive. Industrial atmospheres contain many contaminants which are usually confined to a specific location.

Asia Corrosion Severity Map
Figure 8

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250-C40 Series

250-C47 Series

250-B15G Series

250-B17 Series

250-B17F Series

CSL -5017

CSL -6004

TP CSL -76

TP CSL -1095

TP CSL -2004

250-C18 Series

250-C20 Series

250-C28 Series

250-C30 Series

250-C20R Series

CSL -141

CSL -1135

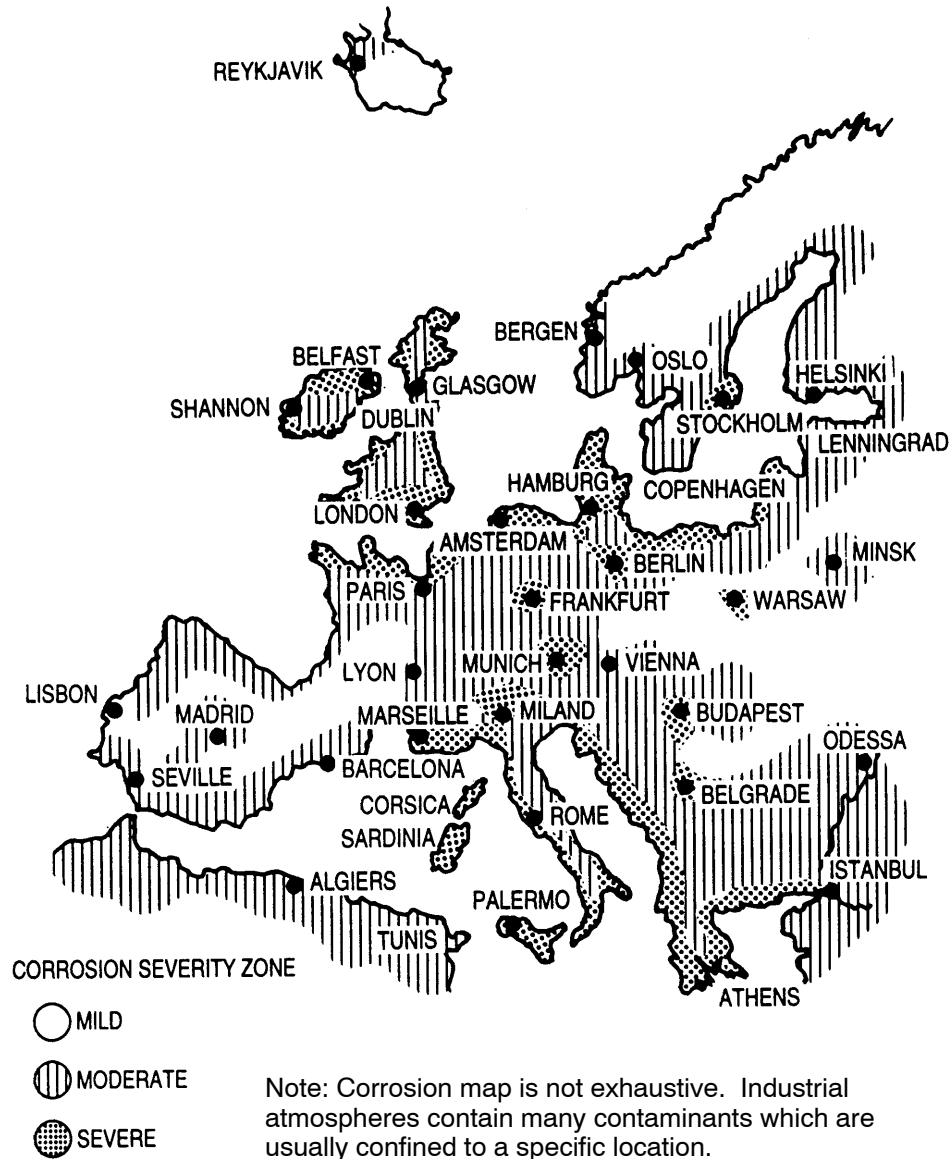
CSL -2082

CSL -3085

CSL -4018

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Note: All islands are considered severe conditions.

Europe and Asia Minor Corrosion Severity Map
Figure 9

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250-C20 Series
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