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Troubleshooting Cameras with Water Ingress Issue

1. Prelude

Installers often encounter outdoor cameras fogged up or water flooded. This technical bulletin addresses the issues and provides solutions. If a camera needs to be returned, this bulletin also outlines the information needed to be collected in order for an engineer to identify the problem.

Figure 1, Camera Fogged Up

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Figure 2, Water Ingress in Camera

2. Basic Knowledge

Condensation: Change of water from its gaseous form into its liquid form

There are two reasons that cause water condensation in a camera.

1. Ambient temperature
2. Temperature difference

Humidity exists in the atmosphere, including inside a camera housing. When camera power is off, the temperature difference between inside and outside of a camera is not significant. Hence no condensation is formed.

When a camera is powered up, heat is generated by the components and warms up the moisture inside of the sealed housing. Due to the distance of the bubble dome away from the heat source, condensation is formed on the dome's interior surface. Some cameras have a thin waterproof film. The film equalizes the internal and external temperatures. When the dome is later warmed up, condensation will gradually disappear.

Hikvision cameras have two condensation-proof solutions.

1. Waterproofing film, used to equalize the internal and external temperature
2. Desiccant, to absorb the moisture inside the camera

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3. Troubleshooting and Solution

3.1 Troubleshooting Workflow
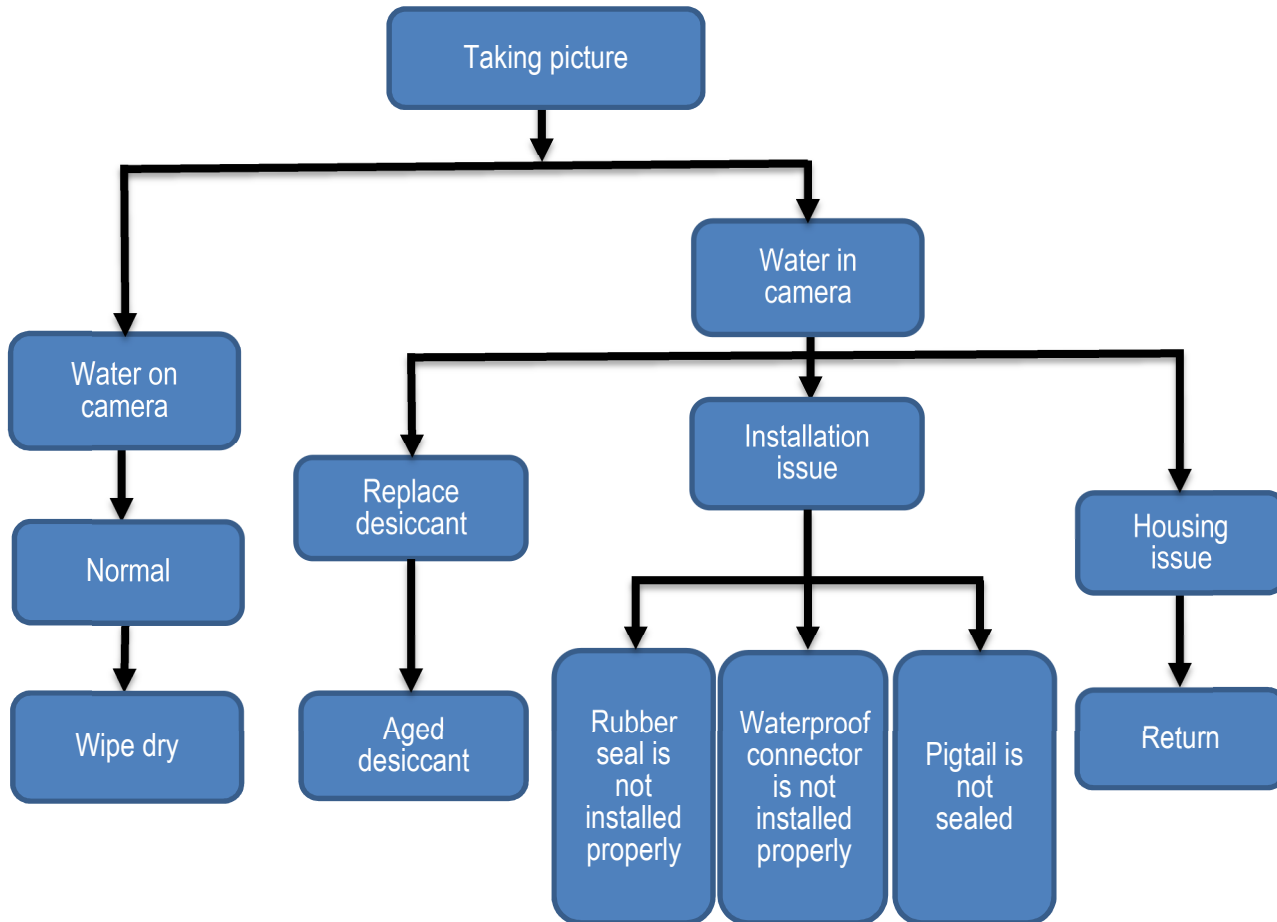
3.2 Follow the procedure below to isolate the issue.

3.2.1 Water on Camera

1. Determine if the water is inside or outside of the camera.

2. If it is outside, simply wipe dry with a clean rag.

3.2.2 Installation Issues

1. Seal is not installed or fitted properly.

2. For a camera with a built-in SD card slot, make sure the SD card slot cap is on and rubber seal is tight.

3. The camera pigtail is not waterproof. Most Hikvision outdoor cameras are IP rated, but this does not include the cable entry pigtail. Pigtail waterproofing needs to be done during installation by the installer. Water will penetrate the Ethernet, BNC, or audio input port if not properly sealed.

4. Rubber seal is not installed or is not fitted properly. We see many installers not installing the seal or not fitting it properly, causing water to enter the housing.

5. Cable needs to enter the camera housing from below, creating a U-shape route to prevent water from dripping into the camera.
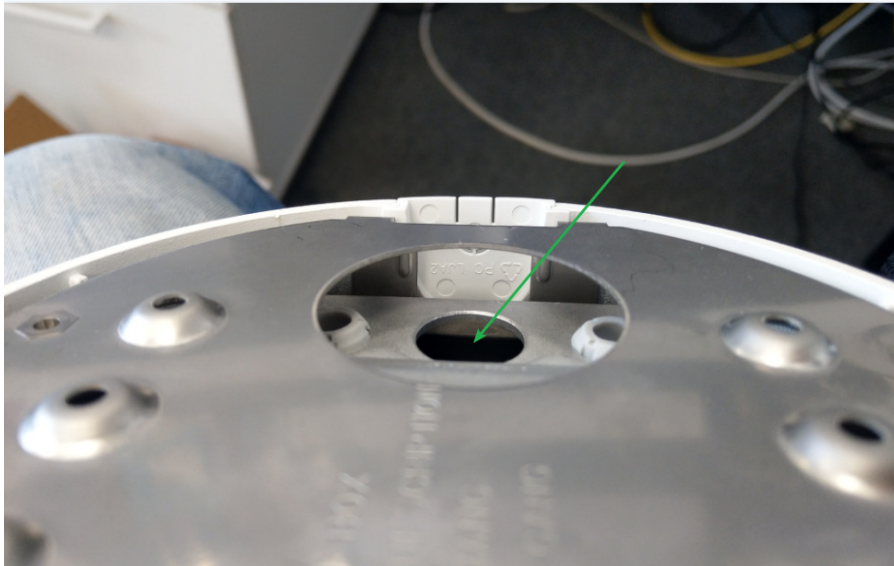
3.2.3 Typical Installation Errors

Figure 3, Water Seal Rubber Is Not Installed

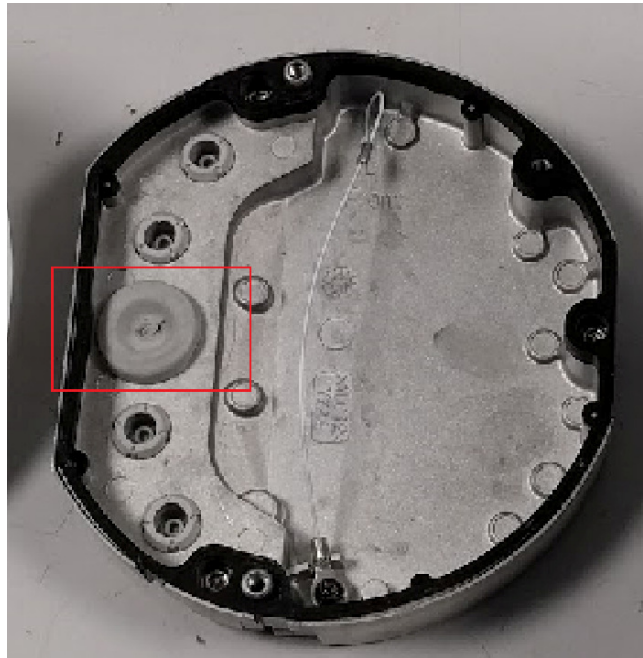| Title:	Troubleshooting Cameras with Water Ingress Issue	Version:	v1.0	Date:	06/28/2018
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Figure 4, Rubber Seal Is Fitted Inside Out

3.2.4   Desiccant Failed

Hikvision camera desiccant comes with a color indicator. Good desiccant appears an orange color, whereas aged desiccant is brownish/green.
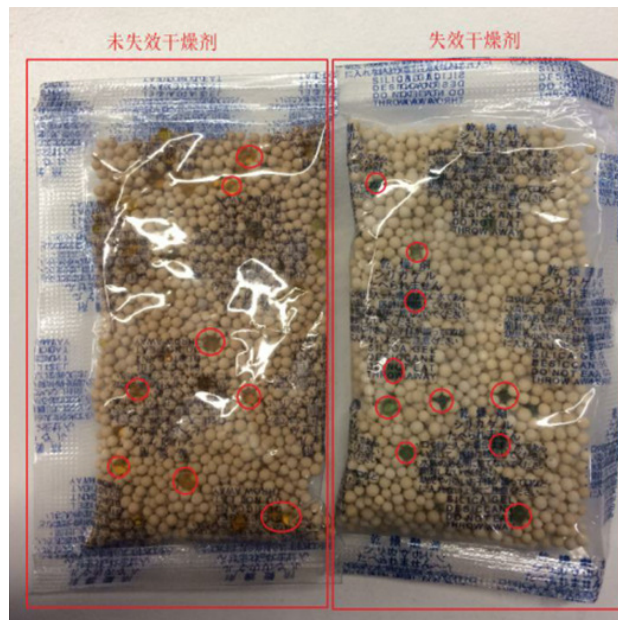

未失效干燥剂   失效干燥剂

Figure 5, Left, Good Desiccant. Right, Bad Desiccant.

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3.2.5 Housing Design Problem

Water will penetrate the camera if the housing is not air tight. This problem needs to be addressed by sending the unit back to HQ for further analysis.

3.3 Solution

3.3.1 Proper installation is standard operation procedure.

1. Rubber seal needs to be pressed firmly. Seal must sit tightly onto the edge.

Figure 6, Rubber Seal Example

2. For cameras with an SD card slot, properly install the rubber seal and close the lid.

3. Properly install the waterproof seal for cable entry.

   NOTE: Refer to the 26, 27, 2Hxx Series installation guide.

4. Waterproof the pigtail.

   1. Insert the waterproof connector.

   2. Run the Ethernet cable without a connector through the waterproof connector as illustrated below.

   3. Attach the RJ-45 connector.

   4. Tighten the connector clockwise.

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Figure 7, Ethernet Port Waterproof Connector

5. Use waterproof tape to wrap all connectors regardless of whether the connector is in use or not. The tape needs to cover at least 1½ inches above and below the connector.

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Figure 8, Waterproofing Pigtail Cable

3.3.2 Replacing Desiccant

For water ingress due to failed desiccant, please RMA the camera to replace the desiccant. If it appears a batch desiccant issue, please contact the quality assurance department.

Please follow the procedure in the appropriate camera guide to replace desiccant.

How To Replace Desiccant for DS-2CD20xx Camera
How To Replace Desiccant for DS-2CD21xx Camera

3.3.3 Return Camera for Further Analysis

If the water ingress is due to housing design, please send the camera back to HQ for further analysis.

Analysis for Returned Camera

1. Simulate the actual client testing environment.

2. Return to factory for air tight test and air flow test.

3. Return to housing design department for further analysis.

4. Open the housing and check desiccant pack condition.

5. If due to batch desiccant issue, contact desiccant supplier for solution. Locate the camera serial numbers that were affected by the bad desiccant.

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NOTE: Air tight test takes approximately 2-3 days.

4. Information Gathering

We will need following information for further analysis.

1. Detailed description of the problem and pictures taken from different angle. This is needed to distinguish whether it is condensation in camera or water ingress.

2. Camera model, full serial number

3. The number of cameras with water ingress and the total number of cameras purchased by the customer

4. The installation environment of the problematic camera

    1. Indoor or outdoor installation. If outdoors, is it sheltered under the eave or exposed directly to rainfall?

    2. Environment temperature, humidity, and local average rainfall at the time

5. How long the camera had been installed

6. Close-up picture of all camera's pigtails, cable entry or gang box.

7. After the camera fogs, does the mist disappear after camera is powered up for some period of time? If so, how long does it take for the mist to disappear?

8. Is the SD card installed correctly, and is the SD card slot seal ring properly installed? Please take a picture of the installation.

9. Check if the camera dome was opened during installation and if the seal is properly fitted. Most installers will open the dome camera to adjust the lens angle. If the seal was not installed properly, this will result in water penetrating the camera.

10. Has the camera been previously repaired?

11. For batch camera issues, return the equipment for R&D analysis. The returned camera must be in as is condition; dismantling is not allowed.

12. Is the camera powered by POE or external power?

The more detail that is provided, the sooner the problem can be identified.