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Risk Management of Aircraft Critical Surface Inspection, Volume 2 of 3 Results of a Survey of Canadian Airline Pilots

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Prepared by:
D.C. Biggs and G.B. Hamilton
SYPHER:MUELLER International Inc.
Ottawa, Ontario

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16. Abstract

This study evaluated the comparative risks of conducting pre-take-off inspection based primarily on visual observation, point detection sensor systems, or remote detection sensors. In this phase of the project, a methodology to evaluate the comparative risks was developed and applied using limited currently available data. Deficiencies in the data were identified and the additional data that should be collected to complete the analysis were recommended. Current regulations, airline procedures, sensor systems, and effects of fluid failure on aerodynamic performance and the likelihood of an accident were reviewed. Risk analysis trees were developed and fluid failure progression data were analysed to determine the risks. The study also included surveys of Canadian and U.S. pilots regarding clean wing inspection procedures, deicing frequencies, and their assessment of fluid failure.

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Le volume 1 est le rapport principal, *Risk Management of Aircraft Critical Surface Inspection, Methodology for Evaluating Comparative Risks*. Le volume 3 renferme les résultats d'un sondage mené auprès des pilotes de ligne américains.

16. Résumé

Cette étude a consisté à évaluer les risques comparatifs associés à une inspection avant le décollage fondée principalement sur l'observation visuelle, sur un système de capteurs ponctuels, ou sur la détection à distance. La présente phase visait l'élaboration d'une méthodologie d'évaluation des risques comparatifs et sa mise en oeuvre à l'aide des données actuellement disponibles. Ayant cerné les trous dans ces données, les chercheurs ont formulé des recommandations quant aux compléments de données à acquérir pour terminer l'analyse. Les travaux ont comporté, outre le survol de la réglementation en vigueur et des procédures en usage dans les compagnies aériennes, l'examen des systèmes de capteurs et l'étude des effets de la dégradation des agents antigivrage sur les caractéristiques aérodynamiques de l'aéronef et sur la probabilité d'un accident. Des arbres d'analyse de risques ont été construits et appliqués aux données concernant la propagation de la perte d'efficacité des liquides antigivrage. L'étude a également consisté à sonder les pilotes canadiens et américains sur les procédures d'inspection des aéronefs avant le décollage, la fréquence des dégivrages, et leur appréciation de la cessation d'efficacité des agents antigivrage.

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RISK MANAGEMENT OF AIRCRAFT CRITICAL SURFACE INSPECTION, VOLUME 2 OF 3
RESULTS OF A SURVEY OF CANADIAN AIRLINE PILOTS

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Glossary of Terms

AC	Advisory Circular
ARP	Aerospace Recommended Practice (SAE)
ATC	Air Traffic Control
Critical Surfaces	Wings, control surfaces, rotors, propellers, horizontal stabilizers, vertical stabilizers or any other stabilizing surface of the aircraft critical to the aerodynamic performance of the aircraft
Fluid Failure	Fluid failure is the term currently used to describe a condition of visible ice crystal contamination on or in the anti-icing fluid film covering a surface, with crystal absorption taking place at a slower rate than the precipitation rate of the contaminating material.
Holdover Time	Holdover time is the estimated time the anti-icing fluid will prevent the formation of ice and frost and the accumulation of snow on the treated surfaces on an airplane; official values for each fluid type are derived from standardized field and laboratory tests, and are published in (SAE) Holdover Time Tables.
HOT	Holdover time (as above)
PIC	Pilot In Command
Pireps	Pilot reports
Pre-Take-off Inspection	Inspection of critical surfaces made immediately prior to take-off
Representative Surfaces	Surfaces identified by the manufacturer that can be readily and clearly observed by the flight crew during day and night operations and are suitable for judging whether critical surfaces are contaminated or not.
SAE	Society of Automotive Engineers
TC	Transport Canada

1. BACKGROUND

The occurrence of a number of accidents in the last decade has increased concerns about the risks of take-off in ground icing conditions. Regulatory authorities have enacted regulations, and airlines and pilots have improved procedures for ensuring the aircraft is free of frozen contaminants prior to take-off. Improvements in anti-icing fluids have increased holdover times, thus reducing the risk of fluid failure prior to take-off. The poor viewing conditions of the wing from either the flight deck or cabin is no doubt a significant factor in assessing fluid failure and/or the existence of wing contaminant. With the advent of sensors capable of identifying fluid failure, Transport Canada (TC) initiated a project to:

> *evaluate the comparative risks of conducting pre-take-off inspection based primarily on visual observation, point detection sensor systems, or remote detection sensors.*

As part of this project, Sypher conducted surveys of airline pilots in Canada and the US. The purpose of the surveys was to improve our understanding of the current wing inspection process and its strengths and weaknesses, and to obtain feedback on the need for additional measures (such as training, operating procedures and/or detection devices). The survey of US airline pilots is documented in Volume 3.

1.1 The Survey

The survey was supported by the Airline Pilots Association - Canada, the Air Canada Pilots Association, Air Transport Association of Canada (ATAC) and TC, and the pilot associations assisted in the distribution of the questionnaires. Pilots were asked not to identify themselves or their employer.

The survey was distributed to 4,700 commercial pilots in Canada in June 1997. A copy of the questionnaire is given in Appendix A. Over 700 pilots completed the questionnaire; this represents a response rate of 15%. The survey provides a wealth of information about current de/anti-icing and inspection procedures. Results of the survey are summarized below.

2. RESULTS OF SURVEY

These findings are based on the responses to questions on the questionnaire and the interpretation of comments made by pilots on the questions. The opinions obtained from the comments are not necessarily representative of the survey population, nor have they been weighted for their frequency of occurrence or the type and level of experience of the respondent. Detailed results for each question, including comments by pilots, are given in Appendix B.

All findings relate only to pilots of air carriers registered in Canada and to standards and procedures in place prior to and during the 1996/97 winter.

2.1 General

The majority of pilots feel that the recent improvements in de/anti-icing standards and procedures have moderately or greatly improved safety (see Figure 2.1). Pilots of turboprop or small jet aircraft are more likely to have found safety to be greatly improved than pilots of larger aircraft. Some of their comments include statements such as:

- "greater awareness" of the need for caution under winter precipitation conditions, "less [pilot] individualism", "education benefit";
- "everybody now agrees on a clean wing"; "prevents cutting corners", "less pressure on pilots, especially small airlines";
- "safety was already high", "little need for [further] change" in ground icing procedures, "overkill"; and
- "there is too much de/anti-icing", "deicing frequently unnecessary", "at a great cost", "harmful to environment".

There is a strong acknowledgment of the benefits of anti-icing fluid, especially among pilots of small to medium sized jet aircraft. Pilots were particularly impressed by the long holdover times of Type IV fluids and called for the greater availability of anti-icing fluids at the small and medium sized airports.

Approximately 20% of pilots are still not comfortable with the current de/anti-icing procedures. Pilots of high wing aircraft are less comfortable with the procedures than pilots of low wing aircraft. Pilots' most common concern was that there is too long a delay after deicing, and they suggested that deicing pads should be located near the end of the active runway and deicing and take-off coordinated through air traffic control. Other concerns included: decisions are now out of hands of the pilots; there is lots of unnecessary deicing, especially when very cold and light dry snow is falling; and at some airports there is inferior equipment and a lack of availability of anti-icing fluids. Improvements in communication, training of ground staff and more education were also mentioned.

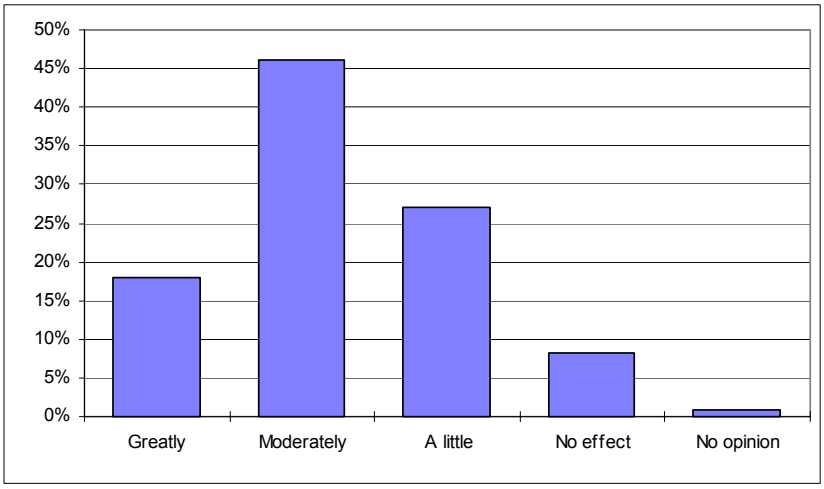

Figure 2.1 Pilots' Views on Whether Recent Changes in De/Anti-icing Standards and Procedures have Improved Safety

Generally pilots found the quality of de/anti-icing service to be better at large airports, but there is considerable variability within the large and small airport groups. Small airports often don't have anti-icing fluid available, usually have inferior equipment, especially in northern areas, and in extreme cases cannot even deice the aircraft within the holdover time (HOT). This is offset to some extent by the shorter taxi and delay times at those airports. The quality of personnel providing deicing service varies at the small airports; some are very good, some are not. Location, rather than size, was mentioned as an important factor. Vancouver was frequently cited as having a poor deicing service.

2.2 Experience

Pilots operating in Canada are generally very experienced, averaging 20 years as a commercial pilot. The average varies from about 14 years for turboprop pilots to 26 years for large jet aircraft. Pilots average 450 take-offs per year, a third of these in temperature of around zero or less. Relative to pilots of larger jet aircraft, pilots of turboprop and small jet (less than 150 passengers) aircraft:

- have far higher number of departures (2 to 10 time as many),
- fly more frequently in winter conditions (about 5% higher),
- have less experience (about 15% to 40% less),
- fly aircraft more susceptible to wing contamination.

The deicing and re-deicing experience of pilots in Canada is summarized by category of aircraft in Table 2.1. Some important features of this experience are:

- Pilots deice their aircraft on average 25 times per year (5.5% of take-offs).
- About 40% of deicing operations are to turboprop or very small jet (less than 70 seats) aircraft, 40% to jet aircraft in the 70 to 150 seat range, and the remaining 20% to larger aircraft.
- A quarter of deicing operations are to high wing aircraft.
- The aircraft is re-deiced after about 3.2% of deicings.
- Turboprop and very small jet aircraft and, surprisingly, very large aircraft (4 jet engine, low wing) are more likely to require re-deicing than the medium size jet aircraft.
- Over 50% of the aircraft that were re-deiced were turboprop or very small jet aircraft.

Table 2.1 Summary of Deicing and Re-deicing Experience of Pilots by Category of Aircraft

Type of aircraft you currently fly		# of departures per year	# of hours flown per year	# of times aircraft de-iced last winter	# of times aircraft re-deiced due to T-O delay	Years as a commercial pilot	% of departures at temps ≤ 0 C
Twin Turboprop High Wing	Mean	709.6	736.7	31.9	1.4	14.9	37.1
	# resp.	115	119	116	111	118	117
Twin Turboprop Low Wing	Mean	1372.4	931.6	63.5	3.1	8.8	41.8
	# resp.	17	19	17	17	19	19
Twin Turbofan - Max 70 pax	Mean	657.3	772.4	32.9	1.3	14.6	36.6
	# resp.	72	75	73	73	75	75
Twin Turbofan - Max 150 pax	Mean	395.0	712.0	25.2	.5	21.6	36.5
	# resp.	242	263	254	261	262	256
Twin Turbofan - Over 150 pax	Mean	177.4	714.8	15.0	.4	25.7	32.4
	# resp.	96	109	106	108	112	111
Three Turbofans	Mean	271.8	682.8	14.9	.7	22.3	21.4
	# resp.	31	32	31	31	32	32
Four Turbofans High Wing	Mean	543.9	661.6	24.4	1.4	18.2	31.2
	# resp.	18	19	18	19	19	19
Four Turbofans Low Wing	Mean	96.4	706.3	8.0	.2	26.9	23.8
	# resp.	61	64	64	63	64	64
> 1 of above responses	Mean	1487.5	737.5	38.5	3.0	15.8	47.5
	# resp.	4	4	4	4	4	4
Total	Mean	449.6	725.9	24.5	.8	20.4	34.2
	# resp.	656	704	683	687	705	697

Generally take-offs can be completed prior to the HOTs expiring. As shown in Figure 2.2, almost 50% of pilots reported that pre-take-off inspections (required at the end of the HOT) were required rarely or never due to expiry of the HOT. About 6% indicated that pre-take-off inspections were frequently required. On average pilots made about 5 pre-take-off inspections last winter and re-deiced on average 0.8 times; i.e., after 16% of pre-take-off inspections. Many of these re-deicings, however, will be due to a conservative assessment of the wing after expiry of the HOT in poor viewing conditions. Thus, most pilots do not frequently make pre-take-off inspections and very rarely identify fluid failure, and will therefore not learn about fluid failure "on the job".

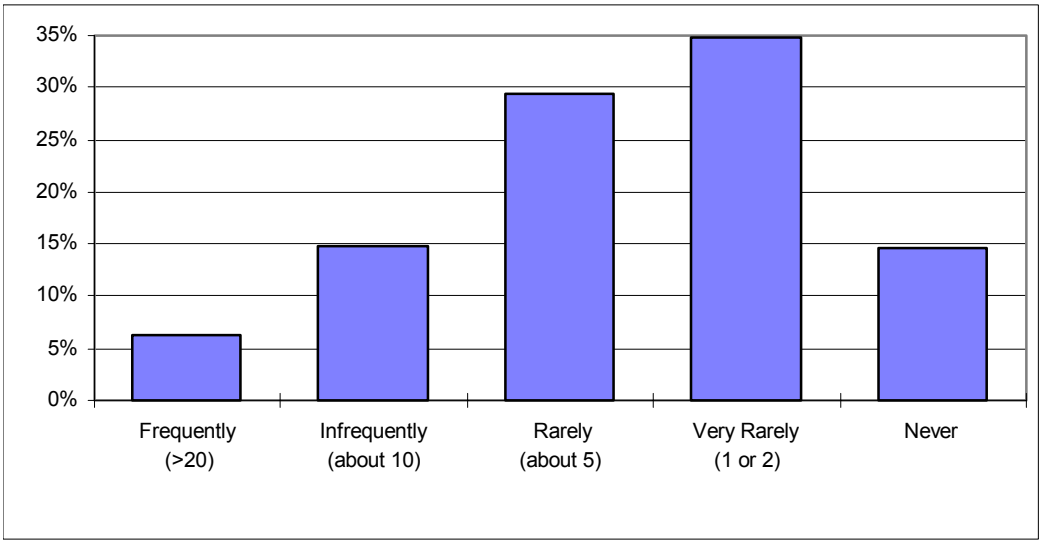

Figure 2.2 Frequency of Pre-Take-off Inspections During Past Two Winters Due to Holdover Time Expiring Prior to Take-off

2.3 Training

Training on the recognition of fluid failure is inadequate. As shown in Figure 2.3, less than 60% of pilots have received verbal instructions on how to recognize fluid failure and only 15% to 20% have seen pictures or videos of fluid failure. When asked to describe how they recognize fluid failure only 80% could give a response for failure during snowfall, and only 66% for failure during freezing rain/drizzle or ice pellets. Of the pilots who responded, the responses indicate that most have a general idea of what to look for. Many mentioned more training is required or they use HOTs. Many were confused between the failure properties during snowfall and FZRA/FZDZ. Clearly, if pilots are expected to assess the condition of the wing during the pre-take-off inspection, better training on the recognition of fluid failure is required.

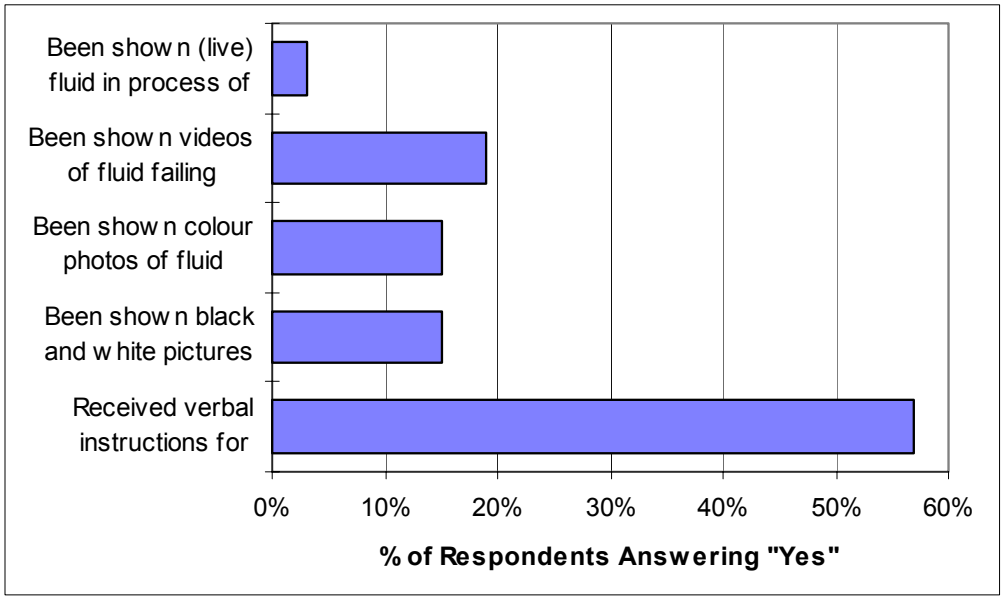

Figure 2.3 Types of Instruction Used in Training on Recognition of Fluid Failure

Over 50% of the respondents thought that training of flight and ground crews was fully satisfactory, despite the lack of knowledge about fluid failure recognition. Some of the suggestions for improvements included:

- better training on fluid failure recognition - pictures, videos, hands-on, etc.;
- better timing of recurrent training - just before winter;
- better training for ground crews, especially contract ground crews:
  - ◊ more standardization (application, fluid type, start of HOT),
  - ◊ improve communication (ground crews should communicate what areas of the aircraft they are deicing),
  - ◊ importance of removing snow from fuselage of aircraft with rear-mounted engines,
  - ◊ too much turnover in ground crew to become experts,
  - ◊ ground crews need better training on "adhering" contamination - often unnecessary deicing in very cold conditions, and
  - ◊ better training at small stations.

2.4 Ground Crew Performance

For the most part pilots are satisfied with the ground deicing service provided. Many found the service to be excellent and have had no problems. Over 75% of pilots did not have reason to question the quality or capability of the deicing service provided and 70% are very confident that the aircraft is clean when cleared by the deicing crew. As mentioned above, many pilots thought ground crew training could be improved. Some

ground crew are not sure at what point during the deicing procedure the HOT starts. About 35% of pilots stated they were informed of the fluid type without asking at some airports and not others, while 10% are not routinely informed of the type. Many pilots commented that they found the deicing service better in Canada than the US.

Despite the generally good performance of the deicing service, there were many reported incidents where the deicing was not properly done, e.g., wings still contaminated, or where the prop was not deiced or only deiced on one side.

Inconsistent application of fluid can lead to fluid failure prior to expiry of the HOTs. Since the pre-take-off inspection is not mandatory prior to the HOT, instances of fluid failure due to improper fluid application may not be identified and could significantly jeopardize safety.

2.5 Assessment of Wing Condition in Pre-take-off Inspection

Representative Surfaces

The majority of pilots indicated that they found that the representative surfaces represent the surface condition of the wing well or very well; 12% indicating very well. About 7% indicated that they represent the wing poorly. The fluid failure tests conducted by APS on a variety of aircraft types under various conditions have found the locations of *first* fluid failure to be variable and rarely to occur on the representative surfaces. The fact that the majority of pilots think the representative surfaces work well is possibly not a good sign. As most pilots do not have a lot of experience with recognizing fluid failure, it could be an indication of false confidence in these surfaces. Comments by many pilots refer to inspection of the "rep. surfaces" rather than the critical surfaces or wing, and give the impression they only inspect the representative surfaces. The pilots responding "not well" and "poor" give many examples of contamination on the other areas of the wing prior to contamination on the representative surfaces.

Some of the comments on representative surfaces suggest that both sides of the aircraft should be inspected and that fluid failure is easier to detect on dark-coloured surfaces.

Factors Affecting Assessment

Pilots' opinions were mixed on whether identification of fluid failure was easier for some fluid types than others. Those who indicated that the type did make a difference often thought the colours of the fluids helped. Many have had little experience with any but Type I fluid.

Pilots identified lighting as the most important factor affecting their assessment of the condition of the wing. The direction of external lighting and the availability of only wing or emergency exit lighting were the main two factors. These were followed by de/anti-

icing fluid on the windows and the option to open the door on high wing aircraft or cockpit window. The ranking of these factors did not vary greatly across categories of aircraft. Other factors included wing span, day/night, precipitation, wind/blowing snow, high/low wing, foaming of fluid and colour of wing.

Confidence in Assessment

Most pilots (87%) have medium to high confidence that they can identify fluid failure during snowfall in daylight, irrespective of whether the snowfall is light or heavy. However, in freezing drizzle in daylight, only 65% of pilots are as confident. Pilots were not as sure what to look for when identifying fluid failure during freezing drizzle and almost all agreed that the assessment was easier in snowfall. The majority have low or very low confidence in the accuracy of their assessment at nighttime, especially with no external lighting and in freezing rain. Average confidence levels of accurately identifying fluid failure over the range of conditions are shown in Figure 2.4. For comparative purposes, confidence in their ability to identify clear ice over fuel tanks (also shown in Figure 2.4) is higher than for identifying fluid failure at night in freezing rain.

There is a strong reliance on the HOTs when deciding on the need to re-deice the aircraft, especially in poor visibility and/or in freezing rain/drizzle. Most pilots (82%) have medium to high confidence that the HOTs reliably indicate the earliest the fluid could fail. As shown in Figure 2.4, average confidence levels in HOTs are greater than for visual observation at night and during freezing rain, but are lower than visual observation in daylight with snow falling.

When it is difficult to identify whether the fluid failed due to poor visibility, pilots are for the most part conservative in their decision to re-deice. If the precipitation and HOTs indicate that the fluid has possibly failed and it is very difficult to see, 85% of pilots indicated they would return to re-deice even if they could not identify any fluid failure. This dropped to 63% returning to re-deice if it was somewhat difficult to see. Only 15% indicated that if they could not identify fluid failures (irrespective of visibility and available HOT), they would only return to re-deice if delayed and subsequent inspection revealed fluid failure.

Location and Method of Inspection

Most pilots (70%) indicated that it is not possible to make the pre-take-off inspection from the cockpit. Of those pilots who could inspect the wing from both the cockpit and cabin, 85% found the cabin better in low wing jet aircraft and 25% found the cabin better in low wing turboprop aircraft. In high wing aircraft, very few pilots found inspection better from the cabin.

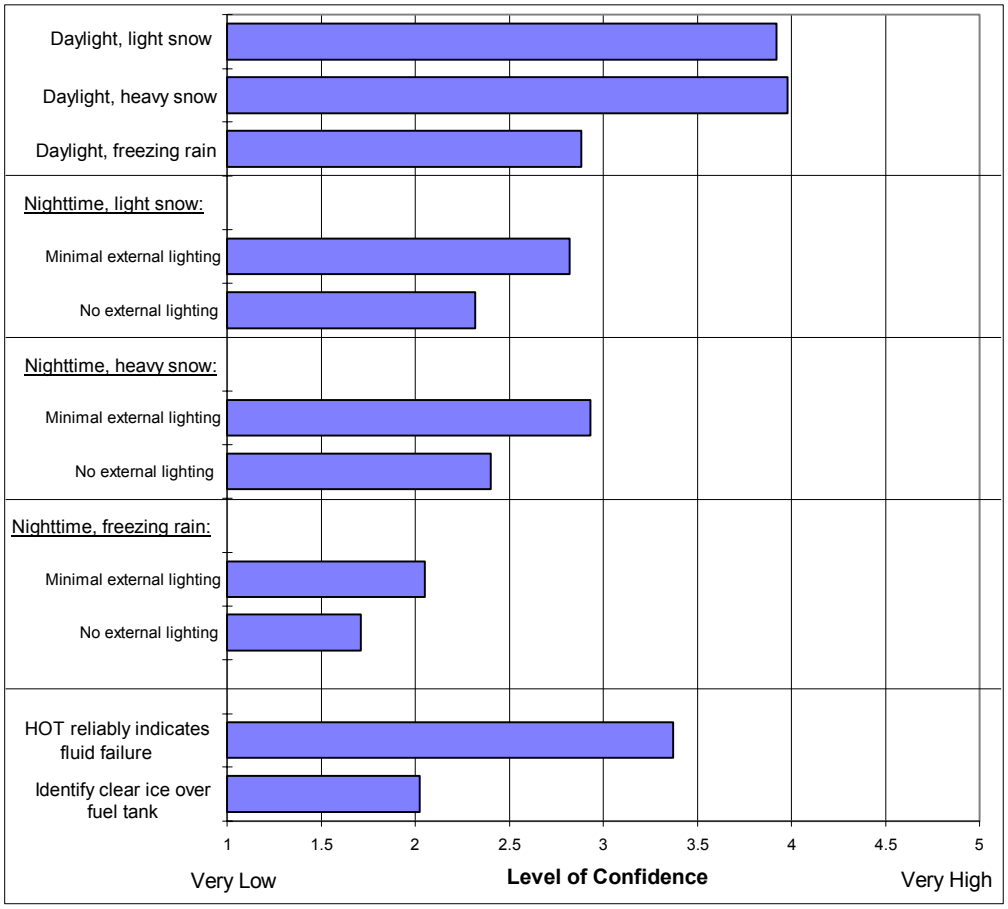

Figure 2.4 Average Confidence Levels of Accurately Identifying Fluid Failure In Various Conditions and Confidence in HOTs and of Identifying Clear Ice Over Fuel Tanks

Pilots that found the cabin better, make their inspection from the cabin most of the time (60%), while those who found the cabin and cockpit similar would only go back to the cabin 15% of the time.

The option of opening the door to visually inspect the upper wing surface is used by over a third of pilots of high wing aircraft, most of these only when conditions warrant a close inspection. Many indicated that while opening the door is not an option for pre-take-off inspection, many use it for the pre-flight inspection.

Many pilots indicated that a tactile check was the only way of really knowing the condition of the wing; they often requested this to be done or obtained (or would like to have had) a ladder to check it themselves. About 60% indicated that they have had a tactile check done for the pre-take-off inspection. For the most part, they only have it done infrequently (less than 20% of the time); however, some (10% of pilots) always have a tactile check done. The use of tactile inspections does not vary greatly between

aircraft categories, but (surprisingly) appears to be done more for the larger aircraft. [Note: there may have been some confusion between pre-flight and pre-take-off inspection when answering this question - answers may be more representative of pre-flight inspections.]

2.6 Holdover Time Tables (HOTs)

Most pilots (84%) find the range in the HOTs more useful than a single value. Generally they feel that the range provides some flexibility and allows pilots to use their judgment in the various weather conditions that can prevail. The few pilots who do not favour a range find it confusing and would like only a single minimum protection time value as they only use this value. Several pilots indicated that with a range being given, the maximum is used, e.g., "With the urge to depart the maximum value of the range is normally used".

2.7 Procedures

Most pilots indicated that at airports equipped with a deicing pad, their air carrier requires a critical surface inspection prior to push-back from the gate. Some indicated that this is done for coordinating use of the deicing pad; others indicated that the check is done by the pilots themselves during their pre-flight "walk around" inspection or by ground crew.

In conditions conducive to ground icing, but when the aircraft was not deiced, most pilots will make a pre-take-off inspection either always (63%) or in certain conditions (25%). These conditions typically relate to the type and intensity of precipitation, temperature and dew point, humidity, etc. Changes in weather conditions were also noted as a reason to re-check aircraft. About 10% rarely or never check aircraft just prior to take-off. A number of pilots mentioned that in conditions conducive to icing they always deice.

The majority of pilots are aware of their company's quality management program to assess the quality or capability of the deicing service. However, 35% are not aware of the program and a few pilots indicated their company does not have a program.

A significant number of pilots (20%) indicated that pre-flight data is not available on the type of precipitation, PIREPS concerning critical precipitation and the possible need to reduce take-off weight. Many (30%-50%) indicated that they were only available at some airports.

Pilots were asked, "given that you are within the HOT limits for light freezing drizzle, does this mean you are can safely take-off in those conditions?" About half the pilots indicated that it was safe, the other half that it was not safe. Most of the pilots indicating that it was not necessarily safe commented that in those conditions they make a visual inspection and/or that HOTs are only a guide. A number pointed out the risks due to runway contamination

and cross winds. However, very few pilots (1%) made the link to the risks associated with airborne icing when considering the HOTs available in freezing rain/drizzle conditions.

2.8 Use of Sensors for Identifying Fluid Failure

There is widespread acceptance that the use of sensors for identifying fluid failure will improve safety. As shown in Figure 2.5, over a third of pilots feel they will greatly improve safety. Pilots of high wing aircraft are most positive about the benefit of sensors to safety. The benefit of sensors in poor visibility conditions was noted by many pilots. There were, however, many caveats expressed regarding the use of sensors. These include:

- they should be used in conjunction with visual inspection;
- they must be accurate, reliable ("fail safe") with few/no false warnings (previous experience with ice detectors have tempered the enthusiasm of many pilots);
- would need to gain confidence in them for pilots to trust them, pilots should be able to self test system;
- they should account for variation along wing span; and
- there should be a simple display in cockpit.

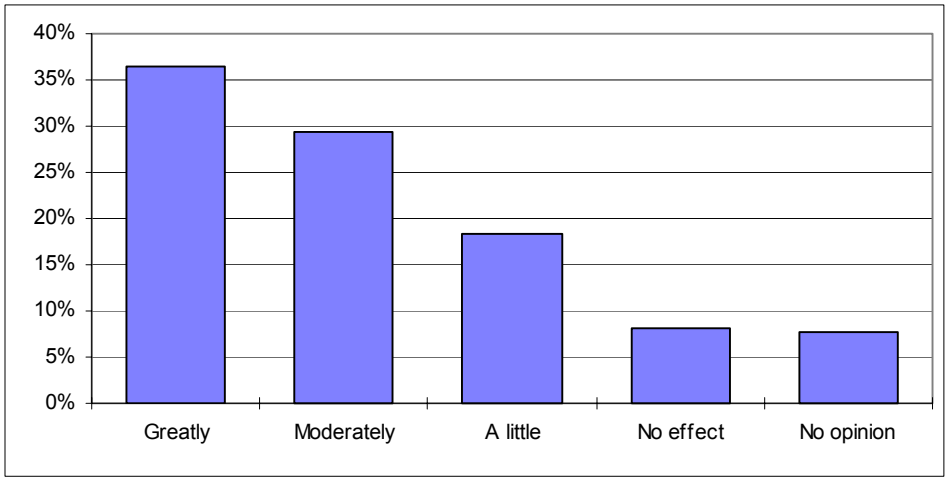

Figure 2.5 Pilots' Views on the Likely Improvement In Safety Due to Wing-Mounted Sensors Capable of Identifying Fluid Failure

Pilots who saw little or no benefit in sensors commented that the benefit will depend on the technology; the sensors will likely be too sensitive and pilots are weary of false alarms. They also commented that reliability will be a problem and unless the sensors are 100% reliable and give few or no false alarms, they will be disregarded by crews. Some pilots are wary of sensors or simply "don't trust them".

Many pilots feel that visual inspection is more reliable than sensors, but in cases where visual inspection is almost impossible (high wing aircraft and poor lighting and visibility), reliable accurate sensors offer a real benefit.

3. FINDINGS

The major findings drawn from the results of the pilot survey are given below.

- Pilots feel that the recent changes in de/anti-icing procedures, standards and fluids have significantly improved safety.
- Long HOTs provided by Type IV fluids have greatly improved the safety margin; pilots also called for the greater availability of anti-icing fluids at small and medium sized airports.
- Pilots cannot make an accurate assessment of the condition of the critical surfaces using visual inspection at night or when visibility is poor, especially during freezing rain/drizzle.
- The training of pilots for recognizing fluid failure is inadequate.
- Pilots rely heavily on the HOTs and are reasonably confident in their accuracy.
- Pilots have confidence in the representative surfaces. Therefore, these surfaces must truly reflect the areas of early failure and/or areas critical to safe flight, or the concept of representatives surfaces should be abandoned.
- Pilots and ground crew are very conservative in their decision on the need to deice and re-deice aircraft. This reduces the risk of take-off with contaminated surfaces, but leads to much unnecessary deicing.
- Sensors for identifying fluid failure would be accepted by pilots only if they are accurate and reliable with no false warning, and the sensors must be used in conjunction with visual inspection.
- A method for determining whether cold, dry snow is adhering to the wing would reduce the number of deicing operations and eliminate a source of uncertainty and conflict.
- Communication between the deicing crews and the pilot needs to be improved.
- Few pilots make the link to the risks associated with airborne icing when considering the HOTs available in freezing rain/drizzle conditions.
- The de\anti-icing service at Vancouver Airport needs to be improved.
- Major improvements in safety would be achieved by locating the deicing pad near the end of the active runway and by having air traffic control coordinate the timing of deicing and take-off. With the long holdover times offered by the new anti-icing fluids, all take-offs could then be completed well within the HOTs.

Appendix A

Survey Questionnaire

Sypher

Risk Management of Aircraft Critical Surface Inspection, Volume 2 of 3
Results of a Survey of Canadian Airline Pilots

AIR LINE PILOTS ASSOCIATION INTERNATIONAL **CANADA**
1300 STEELES AVENUE EAST □ BRAMPTON, ONTARIO L6T 1A2 □ 905-453-8210 □ FAX 905-453-8757

June 2, 1997

TO THE AIRLINES PILOTS OF CANADA

We represent you on Transport Canada's 'STANDING COMMITTEE ON OPERATIONS UNDER ICING CONDITIONS". One of the objectives is to encourage and, where possible, promote aircraft icing related research and development. There is a requirement for direct line pilot feedback by means of the attached questionnaire. Although there is a large amount of ongoing research and development, also numerous papers including ALPA's "INFLIGHT STRUCTURAL ICING", AES's, "A CANADIAN CLIMATOLOGY OF FREEZING PRECIPITATION, and a detailed study using data from St. John's Newfoundland, we need the men and women that actually operate within the environment to send their message to Transport Canada.

To properly evaluate the level of success of the ground icing program, which is our way of preparing for a safe flight, please take the time to complete these questions. They are to be kept completely confidential, and do not ask for nor require your name or particular airline.

As the voice of Airline Pilots in Canada, let us use your valuable input to help achieve our primary goal, "ZERO ACCIDENTS" in air transport!

Captain Peter Foreman
Canada Central Air Safety Chairman

TAKE-OFF CLEAN WING INSPECTION RISK ASSESSMENT

QUESTIONNAIRE

The recent advances in ground de/anti-icing owe much to the TC Ground Icing Operations Standard established in conjunction with the airlines and pilots, in addition to the improved de/anti-icing fluids, and the ongoing research into techniques for implementing the clean aircraft concept.

The safety record suggests that PICs are acting responsibly within the TC Ground Icing Operations Standard by returning to the deicing pad when they are unable to verify that the aircraft is clean just prior to take-off even though the specified holdover time (HOT) may not have expired.

The advent of wing sensors to detect de/anti-icing fluid failure offers an additional means of continuous monitoring to supplement the visual inspection by flight crews. The consequences of fluid failure, and therefore the actual risks, depend upon many factors including the flight crew's success in assessing the clean wing condition prior to take-off roll.

Poor viewing conditions of the wing from either the flight deck or cabin is no doubt a significant factor in assessing fluid failure and/or the existence of wing contaminant. Accordingly, TC has initiated a project to:

> *evaluate the comparative risks of conducting pre-take-off inspection based primarily on visual observation, point detection sensor systems, or remote detection sensors.*

The analysis will be assisted by obtaining information from as many active commercial pilots as possible.

Purpose of the Questionnaire

- To assess the level of success achieved in recent years in addressing the problem of ground icing
- To obtain feedback on the need for additional measures to improve the situation (such as training, operating procedures and/or detection devices)

How You Can Assist

Within this background, your input is being requested by means of the attached questionnaire. The questionnaire has been reviewed by the Airline Pilot Association of Canada, the Air Canada Pilot Association, ATAC, TC and NAV CANADA, and is being distributed and collected by the pilot associations.

If you do not know an answer because a question includes details you have not been exposed to, it would be helpful it you could be frank and tell us.

Please do not identify yourself or your employer

Please insert the completed questionnaire in the pre-paid business reply envelop in which you received the questionnaire and post by June 20, 1997. Thank you very much for your assistance

QUESTIONNAIRE

A. GENERAL

A1. Do you feel recent changes in de/anti-icing standards and procedures have improved safety?

❑ Greatly ❑ Moderately ❑ A little ❑ No effect ❑ No opinion

Comment:_____

A2. Do you feel that the wider availability and recent improvements in anti-icing fluids have improved safety?

❑ Greatly ❑ Moderately ❑ A little ❑ No effect ❑ No opinion

Comment:_____

A3. Do you feel comfortable with the de/anti-icing procedures in use today?

❑ Yes ❑ No If no, please explain:_____

_____

A4. Does the size of the airport affect the quality of de/anti-icing service provided?

❑ Yes ❑ No Comment:_____

_____

B. PILOT EXPERIENCE

B1. Please indicate the configuration of aircraft you currently fly:

- ❑ Twin Turboprop High Wing
- ❑ Twin Turboprop Low Wing
- ❑ Twin Turbofans - maximum 70 passengers
- ❑ Twin Turbofans - maximum 150 passengers
- ❑ Twin Turbofans - over 150 passengers
- ❑ Three Turbofans
- ❑ Four Turbofans High Wing
- ❑ Four Turbofans Low Wing

B2. How frequently do you fly:

- ◊ no. of departures per year _____
- ◊ no. of hour flown per year _____ hours
- ◊ no. of times your aircraft was deiced during last winter _____
- ◊ no. of times your aircraft was re-deiced last winter due to delay in take-off _____

B3. Approximately what percentage of your departures last year were made under near or sub-zero temperatures (OAT): _____ %

B4. How many years have you been:

◊ a commercial pilot? _____ years
◊ operating in areas subject to ground icing? _____ years

B5. During the past <u>two</u> winter seasons when you have been part of the flight crew, how frequently have pre-take-off inspections been necessary because take-off could not be attempted before the HOT expired:

❑ frequently (about 20 or more times each winter)
❑ infrequently (about 10 times each winter)
❑ rarely (about 5 times each winter)
❑ very rarely (1 or 2 times each winter)
❑ never (not once in the 2 winters when you have been crew)

C. CONFIDENCE

C1. During your training for ground icing, have you:

◊ received verbal instructions for recognizing fluid failure..... ❑ Yes ❑ No
◊ been shown black and white pictures of fluid failure ..... ❑ Yes ❑ No
◊ been shown colour photos of fluid before and soon after fluid failure ..... ❑ Yes ❑ No
◊ been shown videos of fluid failing..... ❑ Yes ❑ No
◊ been shown (live) fluid in process of failure ..... ❑ Yes ❑ No

C2. Is the training of flight and ground crews fully satisfactory?

❑ Yes ❑ No

If no, please suggest improvements:_____
_____
_____

C3. In this past winter season have you had reason to question the quality or capability of deicing service provided to your aircraft prior to departing the deicing pad?

❑ Yes ❑ No

If yes, what action did you take? _____
_____

C4. How well have you found the representative surfaces to represent the surface conditions of the wing? (answer only if you have been able to assess condition on most of the wing)

❑ Very well ❑ Well ❑ Not well ❑ Poorly ❑ Not able to assess most of wing

Comment: _____

C5. How do you recognize failure of de/anti-icing fluid:

a) during snowfall? _____
b) in freezing drizzle/rain or ice pellets? _____

_____

C6. Is it easier to identify fluid failure during falling snow or during freezing drizzle/rain?

❑ Easier in snow ❑ Easier in FZDZ/FZRA ❑ Both similar ❑ Not enough experience

Comment: _____

Does the type of fluid influence your response? ❑ Yes ❑ No ❑ Not enough experience

If yes please comment: _____

C7. How confident are you that:

	Confidence: Low				High
a) You can identify fluid failure accurately under the following:					
◊ Daylight, light snow	1	2	3	4	5
◊ Daylight, heavy snow	1	2	3	4	5
◊ Daylight, freezing rain	1	2	3	4	5
◊ Night time, light snow,					
- minimal external lighting (eg. on apron)	1	2	3	4	5
- no external lighting (eg. end of runway)	1	2	3	4	5
◊ Night time, heavy snow					
- minimal external lighting (eg. on apron)	1	2	3	4	5
- no external lighting (eg. end of runway)	1	2	3	4	5
◊ Night time, freezing rain					
- minimal external lighting (eg. on apron)	1	2	3	4	5
- no external lighting (eg. end of runway)	1	2	3	4	5
b)You can visually identify clear ice over the fuel tanks on the wing from inside the aircraft?	1	2	3	4	5
c)The HOT reliably indicates the earliest the fluid could fail?	1	2	3	4	5

C8. Please rate the importance of the following factors in affecting your assessment of the condition of the wing (rate on scale 1 - 5):

	Importance: Low				High
◊ wing span	1	2	3	4	5
◊ availability of only wing & emergency exit lighting	1	2	3	4	5
◊ direction of lighting at night	1	2	3	4	5
◊ de/anti-icing fluid on windows	1	2	3	4	5
◊ option to open door or window to get a better view of the wing	1	2	3	4	5
◊ other factors _____	1	2	3	4	5

Comments on above factors or interactions between factors

_____
_____
_____
_____
_____

C9. If, just prior to take-off, you make your best judgment of the wing condition and cannot identify whether the fluid has failed or not, would you return to deice again :

❑ only if take-off is delayed and subsequent inspection revealed fluid failure (i.e., irrespective of HOT and visibility),

OR, fluid condition is

❑ very difficult to see & HOT/precipitation indicates fluid possibly failed
❑ somewhat difficult to see & HOT/precipitation indicates fluid possibly failed
❑ very difficult to see & irrespective of HOT
❑ somewhat difficult to see & irrespective of HOT

(select the most appropriate one from the list above)

C10. On the aircraft you fly, is it possible to conduct the pre-take-off inspection from the cockpit?

❑ Yes ❑ No

If Yes,

a) From your experience, can you make a better assessment of the wing condition from the cabin or cockpit? The cabin is:

❑ better ❑ similar ❑ worse ❑ varies depending on section of wing

b) Please give the % of time you make the inspection from the cabin _____%

C11. If you fly a high wing aircraft, when conducting a pre-take-off inspection do you open the door and visually inspect the upper wing surface?

- ❑ I don't fly high wing aircraft
- ❑ Yes - always
- ❑ Yes - in certain condition, please specify _____
- ❑ No

C12. Would a signal in the cockpit linked to sensors capable of identifying fluid failure located on areas of the wing where the fluid typically fails first improve safety?

❑ Greatly ❑ Moderately ❑ A little ❑ No effect ❑ No opinion

Please comment: _____
_____
_____

D. PROCEDURES

D1. Are you, or would you be, comfortable with a ground deicing program which allows take-off within the specified HOT without conducting a further pre-take-off inspection?

❑ Yes ❑ No Comment _____

If no, do you routinely make a visual pre-take-off inspection in these situations?

- ❑ Yes - always
- ❑ Yes - in certain conditions, please specify_____
- ❑ No - rarely/never

D2. In conditions conducive to ground icing, but the aircraft was NOT deiced, do you routinely make a visual pre-take-off inspection just prior to take-off?

- ❑ Yes - always
- ❑ Yes - in certain conditions, please specify
  _____
- ❑ No - rarely/never

D3. As part of the pre-take-off inspection, do you ever have a tactile inspection of the critical surfaces done by personnel outside the aircraft? ❑ Yes ❑ No

If yes, give approximate % of pre-take-off inspections where tactile inspection was done _____%

D4. The holdover time tables give a range of holdover times for a specific weather condition. Do you find a range more useful than a single value?

❑ Yes ❑ No Comment _____

D5. How confident are you that the aircraft is clean when cleared by the deicer crew?

❑ Very confident ❑ Fairly confident ❑ Not confident

Comment: _____

D6. At each airport, are you informed of the type of fluid in use for deicing and anti-icing without specifically asking?

❑ Yes, at all airports ❑ Yes, at some airports ❑ No

Comment: _____

D7. At airports equipped with a deicing pad, does your air carrier require a critical surface inspection prior to pushback from the gate?

❑ Yes, at all airports ❑ Yes, at some airports ❑ No

Comment: _____

D8. Does your company have a quality management program to assess the quality or capability of deicing service provided in accordance with TC Ground Icing Operations Standard?

❑ Yes ❑ No ❑ Not aware of QM program

Comment:_____

D9. Given that you are within the HOT limits for light freezing drizzle, does this mean you can safely take-off in those conditions?

❑ Yes ❑ No Comment _____

_____

D10. During preflight is data available on the expected delay due to:

	Yes	Yes at some airports	No
◊ type of precipitation	❑	❑	❑
◊ pireps concerning critical precipitation	❑	❑	❑
◊ possible runway contamination	❑	❑	❑
◊ possible need to reduce take-off weight	❑	❑	❑

D11. Do you have any general comments on devices, training and/or procedures to improve safety in icing conditions - please attach comments

---

Please insert the completed questionnaire in the pre-paid business reply envelop in which you received the questionnaire and post by June 20, 1997. Thank you very much for your assistance

Appendix B

Detailed Results of Survey

APPENDIX B - DETAILED RESULTS OF SURVEY

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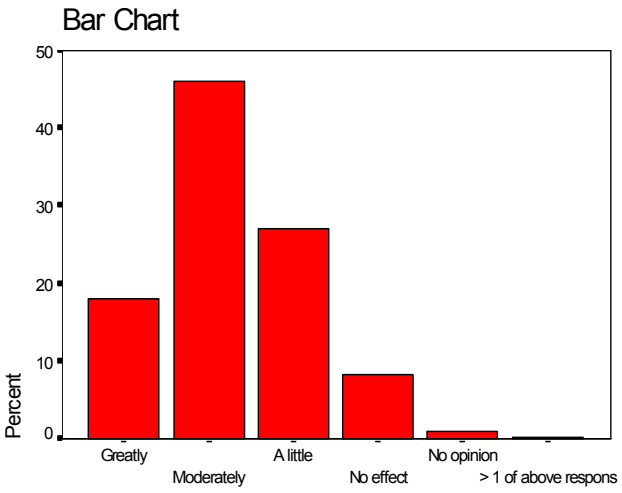
A. GENERAL

A1. Do you feel recent changes in de/anti-icing standards and procedures have improved safety?

Effect of recent changes on safety

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greatly	125	17.6	17.9	17.9
	Moderately	322	45.2	46.0	63.9
	A little	189	26.5	27.0	90.9
	No effect	57	8.0	8.1	99.0
	No opinion	6	.8	.9	99.9
	> 1 of above responses	1	.1	.1	100.0
	Total	700	98.3	100.0	
Missing	System Missing	12	1.7		
	Total	12	1.7		
Total		712	100.0		



Comments:

A little - We always used the clean wing concept
Moderately - When I worked for a small Co. greatly(enforcement) now I work at a bigger Co. Mod. (Improved fluids)
A little - We were doing it before the changes
Moderately - No company "second guessing" if a spray was required or not
Greatly - On regional feeder carriers + charter operators major carriers were already very safe.
A little - We always use the clean wing concept
A little - With our airline there was not a significant problem therefore there was little change
A little - "Education" a benefit more related to small carriers
Moderately - There are guidelines that now clearly establish when you can or cannot go. There is obvious legal implic. if not follow guidelines
A little - Company procedures were already excellent
No effect - Any professional pilot in Canada already strictly observed the "clean wing concept"
Greatly - Still lacking somewhat at the Northern our out bases
A little - Was little need for change
No effect - Our company standards and procedures changed very little
A little - De-anti-icing is overdone
Moderately - Still have to ask Lead for type of deicing fluid used often
Greatly - Having personnel involved with A/C aware of the dangers of icing helps prevent corner cutting
A little - Pilot awareness has increased
A little - As an airline we already did most of these procedures
Moderately - Our airline always had excellent guidelines
A little - Forces those who would go with ice to deice, however some of these people would go anyway
A little - Still using methods + equipment from the 60's
Moderately - The changes have reduced the pressure on the captain as he now has more support to do the right thing
No effect - Has been taken too far. Pilots always acted responsibly in regard to deicing. Now flt attend. bag handlers in cockpit pressing decisions
Greatly - Fluid w/ long holdover times/ education
A little - Rule are so that we sometimes have to deice cold airplanes when snow present but not sticking, creating hazardous situation as a result
A little - Many pilots already had high standards, it has forced a few to conform to those high standards
Moderately - None, it has only added cost to Air carrier by taking the decision out of the pilot's hands and letting other groups have a make work
Greatly - New Type 4 Ultra, (availability good too) Co. standards closely follow new Regs & gov't improvements
Moderately - Has made smaller operations pilots more aware
A little - Not in my airline
Moderately - Sometimes deiced when not req'd (so little) however no one takes chances anymore
No effect - Type 4 has a high freezing tempt is not widely available
Moderately - Most of the major airlines already had a sufficient deice program
Moderately - Having to respect "unqualified" opinions creates tension and animosity
A little - At much too great a cost, we frequently deice when it is plainly not necessary
Greatly - Operator pressure is virtually non-existent
A little - It has been always an elective issue, only a few would have ignored the obvious
No effect - The Dryden Inquiry was typical government overkill
Moderately - Moderately because they are somewhat an overkill
No effect - Standards have always been adequate
Greatly - Quality of fluids + holdover times greatly improved
Moderately - They have also increased cost

Moderately - Pilots should make the final decision whether they get sprayed or not
A little - Still instances of ground personnel claiming no deicing needed, when I can see frost on the wings from inside the aircraft
A little - Procedural changes have had less effect than the increased awareness of pilots that they are being watched
Moderately - Improved attitude
A little - Operated in winter weather for 30 years with no problems before
Moderately - Airlines have spent more on new equipment
A little - We are safe without regulations
Moderately - A/C being deice when not necessary
Moderately - Less so in northern domestic airspace
Invalid response - Now many feel they must deice in situations where they would not have in the past. Threat of enforcement procs. greater anxiety more unsafe
A little - Already had very high standards
Moderately - Education still the primary means of accident avoidance
Moderately - Not so much in our operation, but in others yes
A little - Our procedures were very good already
A little - Majority of pilots are well aware of risks of icing
Moderately - More small operators (owners) are getting the message
A little - A responsible pilot would not T/O if in doubt of wing contamination
Moderately - Where some operators comply & they did not before
Moderately - Good getting better
A little - Holdover times very useful for guidance purposes
Moderately - My company has dedicated to "clean wing" for many years prior to the industry's awareness
No effect - Airmanship always did dictate safety
No effect - Operators still not providing enough tools
Moderately - Much greater effect for "non" major airlines
No effect - I have always required that my aircraft wings are completely free of snow & ice prior to T/O
Moderately - My observations are that not all carriers apply the same standards
Greatly - Much more awareness throughout operation
Moderately - Still need to reduce delay time from de/anti-ice to T/O
Greatly - Clean wing concept and enshrining this into law have really helped
Moderately - Sometimes overzealous by spraying wheels, etc.
Moderately - People are more aware and more careful
No effect - Never big problem before with large commercial A/C in Canada, Dryden was aberration induced by incompetent management & poor HOT control flaw
A little - Some pilots still ignore holdover times or stretch them by a few minutes to accommodate their departure
Moderately - Needs to be tied in with Air Traffic control RE: Taxi time
Moderately - Less pressure by operator to " go"
A little - The public has gained a little info but it is costing the CIE's a lot of $ due to unnecessary deicing
Invalid response - I think some of the new procedures have compromised safety
Greatly - Faster deice wings
A little - Holdover time guidelines & fluid types only
Moderately - Type 4 excellent
No opinion - If the major carriers check and balances were already in place, how the changes affect small center companies, I do not know
Greatly - If monitored & enforced system wide
Greatly - One word -Dryden
Invalid response - Probably
No effect - Believe or not - de/anti-iced when required before recent changes
No effect - Our airline has been consistent
Moderately - Should deice at holding bay
Greatly - Support staff + no. of deicing pads need to increase to expedite departure
Moderately - I think our company standards are always high-recent changes certainly caused more awareness
A little - For smaller carriers - yes, for large carriers - no
A little - Crew training most important
Moderately - I feel most of us have been using the clean wing philosophy for years
Moderately - Awareness level increased
No effect - Our airline did a great job before
Moderately - Never had a problem in North, Artic or airline, 35 years flying
Moderately - I have witnessed & reported contaminated A/C that have departed
Greatly - Since Monashkey inquiry - everybody (management & pilots) agree on a clean wing
Moderately - Increased awareness, ie. a little ice is unacceptable
A little - Overkill
A little - Small carriers try to get away without spraying because of cost and pressure on pilots
Moderately - Most of us were already doing a good job
Greatly - Greater input more eyes
A little - Our A/C standard was very high before
A little - Too many customer relation sprays (ie. spraying when not really needed)
No effect - System was safe before
Greatly - Greater awareness and less individualism
Moderately - It has raised the lowest denominator
A little - The clean wing concept is not new
No effect - Lot of unnecessary bureaucracy but has not changed much as I never had problem. We now have non-pilots making pilot decisions
Greatly - Except that some pilots still believe that some ice/slush is OK
Moderately - Follows company procedures
Moderately - Little change to company's existing procedures
Greatly - However in one area it has decreased

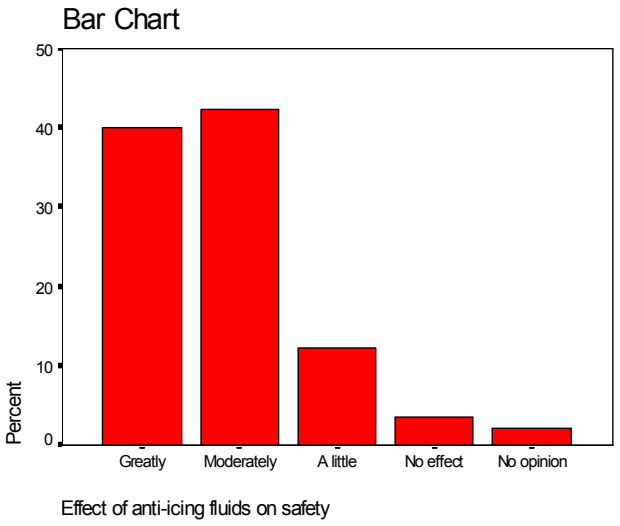
Moderately - In the south (Canada) with everybody "watching" -yes, in the north it still depends on pilot & operator
No opinion - The attention paid by pilots to anti-ice on ground & in air is most important, grounds persons knowing about potential hazards is a goo
No effect - I am only aware that an A/C may not T/O with a contaminated wing. This has been in effect in my 17 years of flying
No effect - Not for major airlines
No effect - Small operators are still doing the same thing I was doing 12 years back
A little - Need more monitoring at small airports
A little - New regs seem excessive however improve educational level regarding icing conditions
A little - Safety has always been top priority
A little - Just makes common sense & airmanship mandatory
Greatly - The recent introduction of proper SOP's in this area has made an enormous difference, as has publication of holdover times
Moderately - Rep. surfaces - weak & ineffective / HOT misleading
A little - Pilots have always been concerned about wing ice
Greatly - Increase pilot awareness of problem/all crew members feel responsibility
A little - Mostly just increased vigilance
No opinion - Flt crews are more than capable of making icing or no icing decisions & the present laws are just another protect the government's tail
Moderately - The changes do not address operational shortcomings ie. fluid availability, non-flight crew inspection
Greatly - Excellent decision making tool
A little - De/anti-icing is not sometimes new! My professional standards & procedures have been safe for over 30 years!
Greatly - New de/anti-icing fluids (Ultra etc.) have been excellent
Moderately - New fluids and more info on holdover times are both useful
A little - Should be done at runway threshold
Moderately - Inspection of "T" tail aircraft should be paramount
Moderately - Transport Canada's attitude should be less political!! re: companies that fly against striking airlines
A little - There was no problem before when standards adhered to
Moderately - As in anything there is always room for improvements and anti/deicing issues are just beginning
No effect - Changes are needed if problems, but none in our company. Why change what works
Moderately - It has made pilot deicing problems and concerns something that management is familiar with
A little - Most of the changes have been as a punishment punitive towards the pilot
No effect - Our airline was the standard that all carriers adopted
Moderately - The public is much more aware of wing contamination, and even though we know the snow will blow off or just to avoid any passenger questions
Moderately - Greater focus on problem
Invalid response - Which recent change?
Moderately - Under certain conditions (dry snow at low temp applying fluid can worsen situation) captain does not have choice
Moderately - Munich & Paris systems are better
Moderately - We already had an excellent de/anti-icing program
Moderately - Becoming over regulated
A little - Larger airports - more attention to deicing, smaller ones - virtually none
Greatly - Before, it was all subjective opinion and management pressure to avoid costs
Invalid response - What "recent" changes?
Moderately - Believe it or not there were many of us safely deicing long before T.C. became involved, However the new rules have brought the unsafe
Moderately - Infrequently, procedures actually are counted to safety
Moderately - Centralized deice usually allows quick access to take off after deice
No effect - When I learned to fly my first instructor said "never T/O with ice frost or snow on the wings". This knowledge counts more than regulate
A little - No change at major carriers
A little - Very small change in my operation
A little - We already had good safety standards & procedures
A little - My company has always been self-disciplined in de/anti-icing STD's
Moderately - Everybody is more aware and is more aware that others are watching
Greatly - I remember the days when we would fire-up the engine and do a fast taxi to blow snow off the wing etc. Oh ya and the credit card scrape
A little - More spraying last winter
Moderately - Major airlines always have had a conservative approach to icing conditions
Invalid response - Don't know what recent changes
No effect - It was safe before
Moderately - Awareness levels have increased
Greatly - Deicing at the regional level was almost non-existent prior to the Dryden Inquiry
A little - Basic pilot training & ground school gave me most of what I needed to know (25 years ago)
Moderately - Skeptical at "outstation"
Invalid response - Improvement must continue
Moderately - Only for smaller carriers that weren't following and procedure
A little - Holdover guidelines & Type IV were overdue
Moderately - Can be improved by location deice area closer to runway
No opinion - Our standards very high - cannot comment on other operators
Greatly - Increase in awareness by crews
Moderately - US large airports lagging

Greatly - Although ultimately the Captains decision to deice - he can no longer say no to deicing when around staff &/or flt crews say deicing
Invalid response - Would not depart if it wasn't safe - ramp procedures are done better
No effect - Standards are not required - education is
No effect - Company Procedures were basically the same as new procedures
Greatly - With longer HOT's of Type IV it reduces stress & subsequently risking a take off
Moderately - Company culture focused on economics has undermined a pilots professional obligation to safety by broadly suggesting a "representative"
A little - We spray more but there is no ability for close surface inspection just prior to departure
A little - I consider the standards and procedures were quite safe before the changes
Greatly - All crews trained to high standard ie. ground crews and has trained to be more aware of contamination
No effect - Had to do with one accident and its silly theatrics
A little - Facilities for deicing are woefully inadequate
No effect - Absolute waste of money & environmentally unfriendly! Large air carrier never have had any problems with safety concerning icing!!
No opinion - No stats to judge; however safety attitude has improved

A2. Do you feel that the wider availability and recent improvements in anti-icing fluids have improved safety?

Effect of anti-icing fluids on safety

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Greatly	281	39.5	40.0	40.0
	Moderately	297	41.7	42.3	82.3
	A little	86	12.1	12.3	94.6
	No effect	24	3.4	3.4	98.0
	No opinion	14	2.0	2.0	100.0
	Total	702	98.6	100.0	
Missing	System Missing	10	1.4		
	Total	10	1.4		
Total		712	100.0		



Comments:

Greatly - Much greater flexibility to choose fluid as per current local conditions
Moderately - See A1
No effect - It improve the operational aspect
Greatly - Type 4 fluid good for long holdover times
Moderately - i.e. Type IV & better understanding of limits
Greatly - Much greater flexibility to choose fluid as per current local conditions
Greatly - Type 4 deice is great. Holdover is greatly improved, and because of its colour you can see when it separates from the wing
Greatly - Better fluids have facilitated better holdover times removing the operational pressure of re-spraying at busy airports
Greatly - Greater holdover times allow more time in the line up
Moderately - Should have Type 4 at more stations
Greatly - Type 4 has increased our holdover times considerably

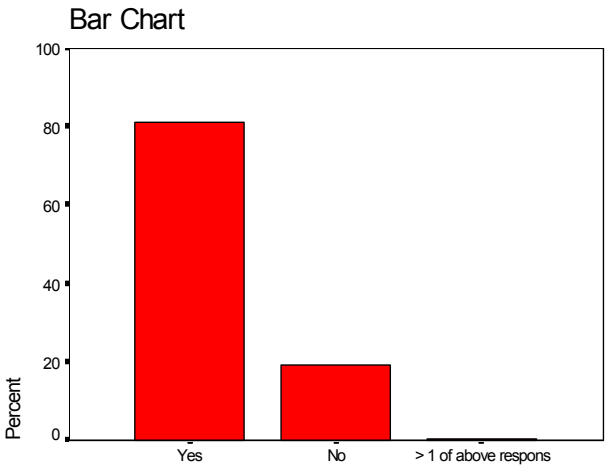
Moderately - Smaller operations in uncontrolled environments will avoid deicing "Management"
No opinion - Still using old fluid
A little - Not commonly available
A little - It has always been available in the system I operate in
Greatly - 30 minute anti-icing holdover should be minimum standard for fluid nationwide
Moderately - Longer holdover times improve flexibility
Greatly - As above
Greatly - Especially Type 4
Greatly - Type 4 is the only to use in heavy snow at a busy airport
Greatly - Longer holdover times are better
Moderately - Type 4 is useful in long delays
No opinion - I'm sure it has, but have not used Type 4 yet knowingly
Greatly - Mostly Type 4
Moderately - Why does it require advance notice to get Type 4, why can't we request it when we are in the deice centre
Moderately - Had transport approved Type 4 fluid earlier the past winter I would have said greatly
No opinion - Cannot comment on fluid improvement
Greatly - The A/C doesn't stall at 250 knts
Moderately - Application equipment in some out-bases is barely adequate
Greatly - Type 4
Greatly - At congested airports with higher volume of departures, holdover times of new Ultra fluid have greatly improved safety margin
No opinion - I don't have any data to answer accurately
Moderately - Technology advancements greatly assist our business
Moderately - Where they improve holdover time
No effect - Type 4 not being used
Moderately - They are not always available eg. YVR at XMas 96
A little - Gives operators more leeway
Greatly - By giving flt crews a longer period of ground time before getting airborne and better protection from icing on the ground
Greatly - Type 4 holdover times
Moderately - Type 4 is very good
Greatly - Type 4 amazing
Greatly - Type 2 fluid is great for extended holdover time
Invalid response - Unsure as to characteristics of today's fluids over yesterday's & comparative changes + improvements
A little - Thick fluids also disrupt airflow on wing surface
Greatly - Type 4 is great - allows us more time which is mandatory for my operation
Greatly - Fluids are excellent & provide realistic protection for our climate
Invalid response - Yes, by how much I'm not certain
No effect - Reverse effect (false confidence in fluids)
Greatly - New fluids providing longer HOT's at busy airports
Moderately - More airports need to have Type 2 & 4 available
Greatly - Type 4 is great improvement on Type 1 fluid
Moderately - Mostly on smaller hard wing types
Moderately - 1
Moderately - Certain stations only have Type 1
A little - Too few stations with Type 2 or better
Invalid response - Probably
Greatly - Longer holdover times - safer
Greatly - Nice to have Type 2
Greatly - Type 4 is a great achievement
A little - As in A1 comment
Moderately - Longer holdover times a great benefit
A little - Depends how they are used
Greatly - Higher holdover times have made life easier in certain airports
Moderately - Holdover time on certain fluids has increased
Greatly - Longer holdover times required in long line-ups
Greatly - Type 4 is great
Greatly - As long as they are available
Moderately - Long holdover fluids are big benefit
Moderately - Easier options - easier decisions
Moderately - Assuming all fluids meet specs
A little - Too much reliance on performance of sophisticated fluids may be creating a trap for the unwary
No opinion - Haven't had the chance to see or use any new types
Greatly - Greater options - greater safety, also we must cater to different A/C types, rotation speed, etc.
Moderately - When they are available
Greatly - Type 2 & Type 4 fluids should be mandatory
Moderately - Type 2 & 4 fluids not always appropriate for slow aircraft
Greatly - Airlines need to publish more info on fluids
No effect - I'm on a DASH- 8. Type 1 has always been available
No effect - I do not use the fluid, I only fly the A/C after it has been sprayed
Greatly - Longer holdover times were a necessity
Greatly - New fluids useful under adverse conditions
Greatly - Particularly the longer holdover times which are important at increasingly congested airports
Greatly - Much better HOT with new fluids
Moderately - There is still a lot we don't know e.g. how various fluids interact with other fluids
Moderately - Better holdover times, therefore less pressure on pilots
Greatly - If you make deicing easier to do & more reliable (HOT wise) more pilots will do it
Moderately - Pilots are still the best judge when, where & what kind of fluids are required
Moderately - Inconsistent supply of some fluids
Greatly - Long holdover times (ie. Type IV ULTRA) are a must at busy airports (ie. YYZ, YUL) due to ATC delays
Moderately - All fluids must be available at all bases. ie. Type I only at LGA
Greatly - Does Air Canada use Type IV
Greatly - Type IV "Ultra" is the answer to long line-ups and delays
A little - All types not always available
Moderately - We should have Type IV everywhere
No opinion - Have not encountered "improved fluids"

Greatly - Longer holdover times proved greater margin of safety
Greatly - If you can get them many stations do not have the selection of fluids
Greatly - In particular the extended HOT in Type IV
No effect - I have never had performance degradation due to residual ice in 22 years
Moderately - Just started using Type IV but any fluid that extends holdover times should improve safety
Moderately - Ultra is a great fluid for the DH-8 in ZR-
Greatly - Type IV very expensive (community deicing bay's useful)
Greatly - Type I is nothing more than bug remover in a car wash. Type IV will hold a ton of water and still hang in there
Greatly - Still need a fluid with longer HOT at very cold temperatures
Greatly - Better lift characteristics a definite plus
A little - Often improved fluids are available but A/C manufacturers & MOT are too slow to grant the approval for use on particular A/C
Moderately - Ultra IV is a great improvement
Invalid response - Not familiar with the availability of fluid
Moderately - Its safer now, but there is a huge amount of waste too
Greatly - Fluids with longer holdover times are wonderful given long ATC delays etc.
Greatly - Longer holdover times (Type IV)
Greatly - Yes, particularly the availability of longer holdover times due fluid improvements
Invalid response - Type II and Type IV fluids have helped greatly
No effect - Still using Type I on my aircraft
Moderately - Every improvement helps
Greatly - With regards to increased holdover times
Greatly - Longer holdover times very beneficial
Moderately - New fluids (anti-ice), deice bay at runway ends
Moderately - Has led to some confusion. Property (differences) of Type I, Type II, and Type IV fluids
Moderately - They are not available everywhere i.e.: most station's only have Type I
No effect - No Type II fluid at most airports in Canada
Moderately - Regional aircraft rotate too slowly for the newest fluids
Moderately - Longer holdover times is a great improvement
Moderately - Disseminate info on new items better!
Moderately - Type IV is a big help operationally but as to safety, if its contamination you don't go... period
No opinion - Never tried any other types as they were not available
A little - Colours & HOT assist in decision making
Greatly - Type IV times are much better
Greatly - HOT's greatly improved
No effect - Improved anti-ice fluids are so far not available
Greatly - Much better HOT's & guidelines to follow as well
No effect - Key is proper/effective use when needed only
Greatly - Type 4 holdover times
Greatly - Introduction of Type IV & longer holdover times
Moderately - Was a passenger on a 767 out of Calgary last winter in moderate snow (sometimes heavy) for 15 minutes and it all came off
A little - I have yet to have the Type II fluids used on my aircraft
Moderately - The longer holdover times with Type II now reflect the longer waiting times for take off at busy airports
Greatly - With introduction of Type II fluid
Moderately - All deice facilities should have both Type I and Type II ultra or Type IV
Moderately - Longer holdover times improve A/C dispatch in poor weather

A3. Do you feel comfortable with the de/anti-icing procedures in use today?

Are you comfortable with de/anti-icing procedures in use today

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	565	79.4	80.9	80.9
	No	132	18.5	18.9	99.9
	> 1 of above responses	1	.1	.1	100.0
	Total	698	98.0	100.0	
Missing	System Missing	14	2.0		
	Total	14	2.0		
Total		712	100.0		



Comments made to prompt: *If no, please explain*:

No - No consistent standard of training for deicing personnel
No - Deicing needs to be done closer to active runway, with GROUND delay between spray & T/O

No - Very complex system at deice centers-potential risk to ground employees
Yes - Sometimes a spray is done as a PR measure when not needed. i.e. cold wing, dry cold snow on top of wing that will blow off at 10-15 kts
No - Control out of hands of Pilot
No - Not completely. I don't agree with the assumed authority some flight attendants may feel they have in regards to stopping the operation
No - The deicing procedure itself takes too long - holdover times
No - Depends on conditions our spraying too often in light snow conditions (dry snow)
No - There is no discretion left in the procedures for an experienced crew to refuse deicing when it is not required i.e. dry snow
No - Should be done in line-up prior to departure
No - Complicated on paper, useless in real life
No - Difficult to verify deicing done properly, as it can often be done by contract personnel. at last minute. deicing done at deicing centres
No - Sometimes in very cold conditions it would be better not to anti-ice but the rules preclude this.
No - You need a system right at the end of runway
Yes - Work but need to be more efficient for less operational delays
No - Some ground staff still require more training (requirements, application, ramifications)
Yes - Yes & no it is impossible to make an accurate assessment looking out a window. PIC.
Yes - So/so
No - Visual check not really very accurate
No - Very difficult to complete a visual check on large aircraft
No - Although fluids have improved deicing should not be airline specific Deice bays should be adjacent to departure rwy Taxi through Concept
No - Aircraft should deice at or close to holding bay
No - Holdover times as published can only occasionally but adhered to. Deicing locations at most A/P are too removed from active runway
No - The smaller airports do not have adequate equipment
No - Ground personnel requires more knowledge of the consequences of their actions
No - Ground crew frequently call for deice when not necessary. e.g. very light dry snow that easily will blow off the wing
No - Many crews are inexperienced in smaller centres
No - Please let the operating pilots make the decisions
Yes - But sometimes we are over doing it
Yes - Yes because it is safe but keep in mind comments of QA1
Yes - Some deice bays are too far from active runway in snow conditions ATC should be more flexible in rwy selection during these condition
No - Deice should not be done on the ramp. It should be done much closer to the departure runway
Invalid response - Deicing bays closer to T/O runways would help
No - Times not long enough, deicing should be done closer to runways for immediate T/O
No - Overkill
Yes - But we are in overkill mode
Yes - Although they should be positioned closer/close to button of rwy in use
No - See A1C, however I am fully confident in the deicing procedures and its thoroughness
No - Far too regulated we do a fine job
No - In moderate to heavy snow the taxi time exceeds the holdover times at some airports
Yes - Company operated using approved/developed operating procedures
No - They are a joke & insult. Put deice facility at departure end of active & spray & go. Also collect FPD & don't pour it into waterways
Yes - Very thorough though inadequate at large airports during times of heavy precip
No - There are still too much of a delay after being deiced
No - Planes should be de/anti-iced near the T/O point just before T/O
Yes - We often deice when it is not necessary
No - Visual (where we are) is not enough
No - Still concerned about holdover times...Type 4 would solve that
No - Poor confirmation that entire A/C has been inspected; i.e. upper fuselage & tail
Yes - Very expensive if used when HOT required practically
No - In our operation it is initiated only by PIC
No - Facilities should be available at runway holding bays. Immediately before T/O
Yes - Yes, as long as pilots follow holdover times and perform PCI once HOT as passed
No - Procedures are established by staff personnel with little or no line experience
Yes - I felt just as comfortable before
No - Deicing a cold wing with no contaminants increases chance of contamination
No - Too restrictive, too inhibiting, too regulatory.
No - Captain is responsible for an employee's poor de/anti-ice (misses fuselage with aft. mounted fans.)
No - Ground crew training & understanding of task is inadequate
No - More info on newer fluids required & statistical data
No - No room for pilot to make decision, -30C dusting that will blow off almost non-existent snow
Yes - Occasional overkill though
No - See above
No - It is bullshit
No - Using Type 1 there is no way to T/O within you holdover time if it is snowing
No - Deicing pads too far from take-off runway
No - Smaller A/P where ground crews do everything I am less comfortable
No - A paranoid passenger can cause an A/C to have to deice again, unnecessarily
No - We have gone overboard at great expense to the airlines
Invalid response - Not much room for personal judgment whether deicing required -i.e. light dusting of snow that will blow off
No - Clumsy and archaic

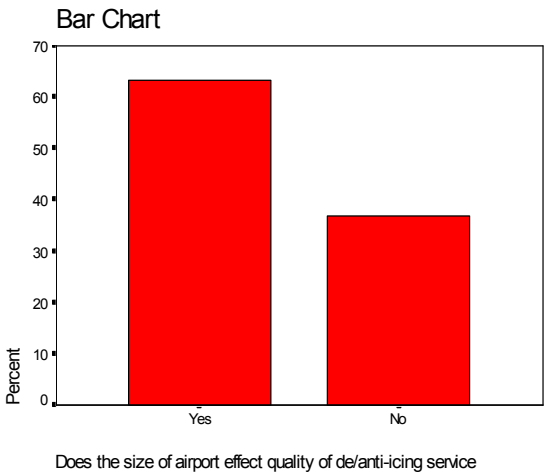
No - Should be closer to runway (ie. less time between spraying & T/O)
No - Anti-icing, deicing should be done near departure runway
No - A better method of evaluating contamination at the threshold is imperative
Yes - But improvements certainly could be made
No - Too much authority has been given to non-pilots
No - No ATC co-ordination for Holdover times win + ATC re time to actual T/O need gantry a la Paris or pads at the end of runways
No - Too much waste of time & $ for unnecessary deicing
No - At smaller A/P it still seems to as though the ground handlers are not always 100%
No - Need accurate time tables for class 1 deice fluid
No - Inadequate ability to inspect critical surfaces
Yes - But why does my company push back +spray, yet other carriers push back at the same time, same overnight layover + they do not spray.
Yes - But, ideally A/C would be deiced just prior to T/O as in Paris
No - See comments on question A1 above
No - De/anti-ice bays at large A/P should be close to departure threshold to avoid holdover problems
No - I feel there is a perception of the general public & some grds people that a light sheet of snow on cold wing is dangerous
No - Some smaller stations use antiquated deicing machines which can take up to 5-8 minutes to complete
No - We deice in -20C weather with very light dry snow. It's a waste of time & money
No - Now every PAX on board is all of a sudden an expert & cause to many delays plus having to deice all the time is not necessary.
Yes - Although it's definitely better to fail safe, there is now paranoia about contaminated critical surfaces & often deicing takes place unnecessarily
Yes - More work to be done on clear ice detection after deicing
No - We need clarification as to whether de/anti-ice systems should be checked on every leg prior to entering icing conditions.
No - Deicing bays at A/P should be closer to T/O point to reduce spray to T/O delays & fluid deterioration in freezing precip
No - Still takes too long to get airborne after deicing (ATC delays, long taxi, inadequate deicing equipment)
No - Education not laws are the best safety hedge possible
Invalid response - Deicing should be controlled by a central authority as it is done in most of Europe by the airport authority & not airlines themselves
No - Portable deice equipment should be used in holding bay of departure runway. Not as in YYZ having a stationary deice pad then 20 m taxi
No - If we could have deicing bays closer to the departure runway threshold this would allow us to have better holdover times
No - Each runway must eventually have a deice bay close to the button, for use by all A/C
No - More airports require Type II or Type IV fluids - also more deice pads near departure runways would help
Invalid response - Determination of wing condition after HOT is less than perfect
No - Communication and co-ordination still a problem
No - In Vancouver you get deiced then tugged to a starting point 4-6 minutes elapse to starting?
No - Need more consistency
No - Too much unnecessary deicing for loose snow on wings. I understand safety must be conservative but at times it is an "over kill"
No - We need departure point "car wash" systems. Used and paid for by all operators
No - Captains opinion not to deice doesn't count. Unnecessary anti/deicing
Yes - But overkill (except) the only stations us "CDG" France to do it promptly
No - Deicing areas should be at runway thresholds... in YVR during precip there could be excessive taxi delays
No - In at least I care, had I not climbed the ladder and checked my own wing by hand we would have been at great risk
No - Ground personnel mistakes i.e.: type of fluid delays, delays, delays to T/O runway
Yes - Coordination of deicing and ATC needs to be improved. Deicing at button would be ideal
Yes - Except they leave no space for pilot judgment i.e.: dry snow not requiring spray
No - ATC needs to let pilots know of take-off delays anticipate after deicing
No - Inadequate ATC integration into the deicing program, delayed taxi or ATC CLX after aircraft is deiced
No - Overkill when I flake of snow is on the wing. Insufficient holdover time with Type I at certain stations
Yes - Generally, the organization and throughput at major stations during a storm is chaos
Yes - International airports only, smaller airports questionable
No - Only Type I available at some A/P. Deicing not available at button
No - Off-gate deicing should be done closer to the runway of departure to minimize the chance of holdover times being exceeded
No - Not all ground staff properly trained on capabilities of deicing fluids relative to environment
No - Comfortable only at major terminals. Small stations lie to the captains so they don't have to don the rain gear
Yes - Partially
No - Usually too long to take-off after deicing. Determining fluid breakdown is guesswork on high wing A/C. Holdover tables don't inspire an
No - I would like to see A/P's establish engines on deicing with two trucks (one each side) just prior to entering the runway. easy to do

No - Major Canadian A/P's should have large central deice pads, akin to a car wash, at runway, hold points, to decrease the time from deice
Yes - See A2
No - Too much second guessing of captains decisions
Yes - But there are still a (small) few pilots who have a casual attitude toward ice
No - Deicing should occur at runway immediately prior to take off
No - Dry snow with passengers comments forces pilots to return to deice when not necessary. Passengers lack knowledge of wing operations
No - There is a tendency at some stations for managers (non-flt-ops) in charge of little less vigilant than necessary e.g.: "There couldn't be
Invalid response - Not entirely, there lacks commonality between airports in many areas of staff training and level of understanding
No - Requirements are fine. The lack of adequate facilities is the problem
Yes - More organization on ground to minimize delays
No - Would prefer pre-departure (at the runway) car-wash type of system
Yes - I'am not at all in agreement with ground personal overruling PIC
No - We have deicing units that take 6-8 min or more to deice the A/C. If Type I is only available it takes 3-4 min to taxi for a total time
No - Poor ground communications, taxi & take off delays, minimal training
No - Ground crews improperly trained and do not understand the significance of/or the reasons for deicing. No understanding of HOT or what
No - Often, too long a taxi time from deice until T/O
No - Deicing/anti-icing areas are too far away from runway threshold
Yes - All involved are better informed
No - Partially, still have to take someone else's word and still your responsibility
Yes - Although the side windows sometimes smear up with fluid which makes the wing harder to see
No - Still some confusion regarding procedures as well as delays
No - I would be much more comfortable with deicing pads near the departure end of rwys at major airports- it would reduce departure delays
No - Should be first come, first served
No - Poor location of deice bays can make HOT(Type I) problematic. Visual insp. of critical surface from cabin window is of questionable accuracy
No - Too stringent clean wing can have some residual surface contamination
No - De/anti-icing should take place at the button of the runway, just prior to take-off
Invalid response - Too much interference from outside cockpit if flight attendant, pax ice police etc.!
No - Maintenance do not oversee the deice procedures, the people doing deice are ramp people non professionals with high turnover, thus co
No - Too rigid, I believe more leeway should be left to pilot
No - Should be some form of outside last minute inspection just prior to T/O
No - Trucks should be closer to runway
No - I feel location of deice pads do not factor in safety. They seem to be more concerned about environment
No - Ground crews do not use common sense when light sprays required
No - Deice completed when sometimes not required. Should have tactile test of deice effectiveness
No - Not with radio procedures used with maintenance. Should be simpler
No - Using "representative surfaces", particularly with ramp lighting, plus administrative interference in operational concerns, undermines
No - Spray areas and departure runways not coordinator - e.g.. too much taxi time required (YYZ)
No - Waste of money to deice a whole heavy due to 6 snow flakes on the wing that a flight attendant or pax has noticed
Yes - Being deiced very near the take off roll would be a great improvement
No - Under certain weather conditions any delay for T/O can exceed holdover time - deicing should take place at runway threshold prior to T/O
No - 1.Deicing pads often to far from rwys 2.Little or no ATC coordination to allow dep. immed. after deicing esp. important at large A/Ps

A4. Does the size of the airport affect the quality of de/anti-icing service provided?

Does the size of airport effect quality of de/anti-icing service

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	430	60.4	63.1	63.1
	No	251	35.3	36.9	100.0
	Total	681	95.6	100.0	
Missing	System Missing	31	4.4		
	Total	31	4.4		
Total		712	100.0		



Does the size of airport effect quality of de/anti-icing service

Comments:

Yes - Smaller airports usually only have one type of fluid
No - Greater awareness at all airports has improved uniformity of service
Yes - Generally larger airports have better streamlined procedures
Yes - Some airports (smaller) have very limited capacity
Yes - Smaller airports are slower in operation causing longer delays
Yes - Deice centres are complex/busy sometimes difficult to communicate with ground personnel re needs + type of fluid
Yes - Good luck getting decided in the smaller Artic airports or reserves. Backpack sprayers are useless on a buildup but what else can we do
No - Major carrier thinking is: It has been done properly, period.
Yes - Smaller airports usually have only one type of fluid
Yes - Size-traffic-flow controls-co-ordination-foulups
No - Not for our airline operation
No - Each airport we operate into has adequate facilities
Yes - Only to the degree of fluid and deice equipment available
No - I find that deicing in certain US airports is done in a less than conscientious manner
Yes - The greater the size airport the more traffic, greater time spent in line up after deicing & prior departures, slow when weather goes down
No - YVR: pathetic system, YYC good, small A/P good
Yes - The length of delays resulting from deicing is proportioned to the size of the airport
Yes - All airports should have de/anti-icing performed near departure end of runway very close to time of departure
No - I operate only out of major airports. Once they are up and running they are all about the same, however we all are aware of the effect
Yes - Less delay at smaller airports following deicing
Yes - Long wait for T/O have Type 4 more easily available En YVR
Yes - Taxi length/time is better at smaller airports
Yes - Type 4 is not available in the smaller stations only Type 1
Yes - Little or no facilities exist at small airports unless major or regional carriers go there
No - Although there may be more facilities it does not mean less time to be deiced due to increase in traffic
No - Until Type 2 + 4 fluids came into use YYZ + YUL used to be most unsafe due to long taxi + lineups
Yes - Small airports usually better due to short taxi time, /on congestion
Yes - Some off line technical alternates are not equipped for onslaught of diversions
Yes - Bigger equipment give quicker service
Invalid response - Only fly large airports
Yes - Example Toronto, sometimes takes hours to be deiced
Yes - Outlying stations often have primitive equipment +limited fluids
No - Our company recognizes the potential for accident, and will stand behind our decisions for deicing
Yes - Better trucks at larger airports
Yes - Little station, little + old equipment
No - Large airports with deicing centres do the best job - small airports also do a good job so long as it is done by experienced personnel
Yes - Lots of small airports still slim to no service
No - Simply the volume of traffic. The quality is satisfactory however the service is very poor
Yes - Extended delay prior to T/O poses holdover time problems
Yes - Yes bigger is better (equipment, fluid type availability, knowledgeable ground staff)
Yes - No Type 2 or Type 4 available in smaller stations
Invalid response - No comment
Yes - Longer wait for T/O at larger airports
Yes - Standardization of equipment & training should be required
No - All airports have their good and bad days
Yes - Smaller airports have faster and more effective de/anti-icing services i.e. less delays to & from
Yes - At smaller airports, the facilities are not the same
No - Boston is a good size airport but has a lousy snow removal record, which in turn affects A/C deicing
Yes - Large airport long delay for T/O
Yes - Too many delays with engines running - fuel!
Yes - The bigger the airport the more complex and length of delays
Yes - Inevitable that delays will be encountered, but if quicker methods could be found at no signif. increase in cost it would be worth it
No - Due to Air Canada staff
Yes - Type 4 may not be available. Some deice machines supply very low flow rates
Yes - Time to the runway
No - But it does affect the taxi time, (due traffic) which is critical some days
Yes - Small airports with limited traffic mean Type 1 fluid only available

Yes - Taxi distance from deice bay to rwy makes a huge difference re: time on ground in current weather conditions
Yes - Larger airports have to accommodate larger aircraft thus they have better equipment to deice the aircraft quicker
Yes - Larger airports longer holdover time
Yes - Some smaller A/P have problems because of lack of experience & exposure to deice procedures
Yes - Larger, better equipped and trained
Yes - Big airports long line ups, holdover time exceeded
Yes - Small airports limit services available
Yes - Please see A3
Invalid response - I only fly into larger commercial centres
Yes - Small A/P e.g. Victoria are not properly equipped. As an added note Vancouver is not either. Mild weather may be the reason
Yes - Where the demand is highest, usually the equipment & service tend to be better
Yes - Some Americans are dangerous to have in your airspace - most unprofessional - about 90% of them. Bullshit is their coat of arms
Yes - Large airports make logistics difficult during congestion
No - It seems all our airports were not built with deice in mind. Too much congestion in ramp areas where deice should not take place
No - Should not
Yes - Longer taxi in poor conditions
Yes - Lineups can be frustrating
Yes - Availability of deice equipment proximity to Rwy
Yes - Greatly
No - Currently fly B767 with good ground support at all airports
Yes - Smaller northern airports have very poor equipment
Yes - Northern/remote airports still lagging
Yes - Certain types of fluid not available at smaller stations
No - Often equipment is different but quality equal
Yes - Big airports just seem to want to get rid of you ASAP, smaller A/P seem more concerned about the whole operation
No - Big or small the need to monitor the process remains the same for an aircraft captain
Yes - Smaller airports - less well trained ground staff
Yes - Re: Artic airports
Yes - Holdover time is more critically inhibited due to taxi/takeoff times at larger airports
Yes - Of course the small airports have old used second - hand cheaper equipment that may not be up to the task
Yes - Very difficult to receive proper service at some USA airports i.e. LGA-ORD
Yes - Not all airports are well equipped some of the small airports deicing anti-icing equipment leaves to be desired
Yes - Large Airports general are equipped with larger more effective equipment to complete deicing quicker optimizing holdover time
Yes - Some machines are slow and inadequate at out-bases
Yes - Smaller airports don't have the variety of deicing fluids
Yes - Busy airports more delays to get deiced & longer wait for T/O
Yes - Generally speaking only larger airports offer latest deice/anti-ice fluids
Yes - Unless referring to Vancouver
Yes - Small airports have co. equipment usually too slow to allow any effective Holdover time except in very light snow conditions
Yes - The ability to handle large volume of A/C & get them to the rwy quickly is better at larger airports
No - Smaller airports seldom require waiting for deicing service
Yes - Smaller airports usually have staff, equipment & procedure problems
Yes - Time delays create problems
Yes - Lineups at large airports following deicing cause problems
Invalid response - Lack of proper deicing fluids
No - Quality of service is high at all airports
Yes - Although smaller airports generally serve smaller A/C & facilities generally OK
Yes - More advanced equip. at larger A/P facilitates faster deice process; little lapse time between wing & tail surf. in relation to HOT
Yes - Usually the smaller airports cannot deliver large volume of fluid in heavy precip.
Yes - Larger airports - Larger and more trucks
Yes - Referring to taxi or holding time length, on the ground
No - It's not quality but more like availability & quantity & type
No - Not in our operation
Yes - Generally the bigger the better
Yes - Smaller the airport the better (quicker) the service i.e. YHZ US YVR
Yes - Long taxi/lineups for active runway
Yes - Long taxi a problem
Invalid response - N/A
Invalid response - Mainly fly to larger airports
Invalid response - It shouldn't
Yes - Not enough equipment or trained people at smaller stations
Yes - Extended taxis & delays can render deice useless under certain conditions
Yes - Waiting for take-off after spray
Yes - Slower at larger airports
No - Quality unchanged perhaps speed of application is slower - but quicker taxi to T/O
Yes - Some airports don't have Type 3 & 4
Yes - Our out stations have smaller deice vehicles & Type 1. Holdover time can expire prior to completion of deicing
Yes - Only major airports offered Type 4 winter 96-97
Yes - Absolutely-larger facilities with more/newer equipment make deicing quick, easy
Yes - Especially in speed of availability
Yes - Able to reach active runway within holdover time more comfortably at smaller airports
Yes - Big airplane - big service

Yes - Larger airports with more departures cause delays because deice cannot keep up with demand during peak period(waited 4 hours to depart)
Invalid response - Sometimes since Type 4 not available at all our stations
Yes - Big - 2 trucks at once
No - Its location relative to Central Canada has an affect on the availability of the new anti-icing fluids, # of deicing trucks, etc.
Yes - The smaller the worst it is
Invalid response - ?
Yes - Same as A1 no point in deice if there are T/O delays
Yes - Environmental interests override operational interests at large airports
Yes - Some places it's not even available
Yes - Large airports slower not as bad as previous years
Yes - Long unnecessary taxi distances degrade safety
Yes - At smaller airports limited equip. means longer time is taken to deice & holdover times usually expire while deice still in progress
Invalid response - Unfair question - deicing pro. are obviously not equal or same at every airport nor should they be
No - My aircraft type utilizes only the larger airports providing proper services
Yes - Larger airports have generally better trained people and better equipment and fluids to cope with severe conditions
Yes - Only Type 1 available at smaller airports
Yes - Smaller airports have limited quantities of specific anti-icing fluid types
Yes - Smaller A/P normally have Type 1 fluid, when they are the airports with frequent delays getting airborne due to inbound/outbound ATC
No - It's more the Airlines than the Airport
Yes - Type 4 fluid not always available
Yes - Possibly
Yes - Small airports equipment is poor
Yes - Affects variety of fluids available training/experience of ground crew with deicing different A/C types
Yes - A lot of airports
Yes - Sometimes not always
No - Just the taxi time after deicing
Yes - YYC a bit better than Rainbow Lake
Invalid response - Probably
Yes - Generally yes, better equipment and more professional ground support (more Money)
Yes - Ideal to have deicing stations prior T/O points
Yes - Larger busier airports are often better prepared & organized
Yes - Equipment & personnel
No - Only operating to larger airports
Yes - Better facilities at larger airports
Yes - Smaller airports have more
Invalid response - Size of airport has no effect
No - Smaller can be better
Yes - Type 4 not available on small airport
Yes - At some of the larger airports they are not prepared for the quantity of A/C needing deicing resulting in rather lengthy delays. At the
Yes - It could, depending on personnel available/traffic
Yes - Bigger the A/P usually the better
No - The larger the A/P & more A/C makes it more likely that holdover time is critical due to weather delays, deice/anti-ice should be done in
No - The size doesn't but the location sure does i.e. YVR
No - Some contractor put very little fluid on wings and it tends to dilute quickly in heavy snowfall
Yes - Does not have the same equipment as a large airport
Yes - Also depends upon where airport is situated in Canada
Yes - Not all fluid types available
Yes - Sometimes too much deice fluid
Yes - Type 4 not being available at smaller stations (ex.YWG)
Yes - Less equipment available
Yes - Smaller stations do not have the proper equipment to do all types that frequent their airport
Yes - Some airfields do not have the most up-to-date anti-icing fluids
Yes - Smaller airports have weaker slower equipment
Yes - Bigger = better
Yes - We provide our own equipment smaller airports/out stations do not have same kind equipment as YYZ-YOW-YUL-YYC etc.
Yes - A larger airport with many departures sometimes seems unable to cope
Yes - Longer taxi times
Yes - However peak periods have a greater affect than facilities
Yes - Smaller airports have less equipment
Yes - The larger the slower the service, ie. waiting times, delays
No - Not so much size as location e.g.. YVR is large but inexperienced
Yes - Usually has bigger equip. at larger airports thus faster deicing less wait for holdover
Yes - Traffic/ATC delays sometimes cause holdover times to be exceeded
Yes - When flying to the many reserves up north there are little or no de/anti-icing service available
Yes - Many smaller airports provide Type 1 only with small/slow application equipment
Yes - Smaller airports often have one truck - leaves less time to taxi
Yes - Taxi time at major airports is a factor after deicing
Yes - Sometimes takes a while to get from icing stand to departure runway
Yes - Large A/P have everything available but require organization. Smaller airports don't always have all types of fluid
Yes - Long taxi times/delays at large volume airports with only Type 1 fluid cause problems
No - Regina is one of the best
No - Better service and fewer ATC delays at smaller airports

Yes - Small airports do not have the big pump units to do the job faster
Yes - Larger airports have and better equipment and better trained staff
Yes - No Type 4 except YYZ-YUL-YOW. etc.
Yes - Bigger airports have better trained staff
Yes - Traffic & delays
Yes - Smaller airports tend to have substandard application equipment
Yes - Available equipment and location of deicing pads. They can differ widely
Yes - Inadequate equipment at most small airports, company's ship outdated equipment to small airports to satisfy requirements
Yes - The bigger the A/P the slower the procedure
Yes - Generally the smaller airports are much more adept at de/anti-icing procedures
Yes - Bigger airports provide better and faster deicing
Yes - Better service at smaller stations
Yes - Smaller airports are often better because usually there is less time between deicing & T/O
Yes - No Type 4 in QM - Delays in YZ
Yes - Especially for regional A/C at small out stations
Yes - Usually less equipment at smaller airports
No - Not that I am aware of
Yes - Very large busy A/P can be overloaded. Delays after deice can require return for another deice
Yes - YHZ could show YYZ-YVR how to deice an aircraft
Yes - Large airports, large line ups equal a need for greater holdover times
Invalid response - ? I do not fly to smaller airports
Yes - Larger A/P have better equip. visually-therefore speeding up actual deice process given better chance of staying within recd. times
Yes - In the arctic deicing is very poor to nil
Yes - Holdover times at large airport with departure delays can be significant
Yes - Better at large A/P, snow blower (like leaf blower) required. Car wash type deicing needed near runways
No - Ice is the same everywhere
Yes - Yes of course at some smaller A/P it is harder to get deiced/equipment
Yes - Poor standardization at smaller A/P, oddball equipment, etc.
Yes - Many airports do not have Type 2 or Type 4 fluids
No - At least not in my experience, However I only operate into larger airports
No - Not for our commuter ops
No - I get the services required when I need them
Yes - Yes the bigger the A/P the more A/C the more the rush
Yes - Needs more services for smaller airports
Yes - YYZ & YVR tend to have longer delays
No - Position of de/anti-icing bays are still a problem at large airports
Yes - Due to equipment small airports sometimes cannot spray the aircraft within the holdover guidelines
No - Some small stations don't have Type 4 fluid, however these airports are not usually busy
No - Proper organization & readiness is independent of airport size. Witness the pathetically bad service provided last winter in YVR.
No - For example Toronto is better than Vancouver but not as good as Ottawa
Yes - Smaller A/P often have little or no capability to spray, large A/P often have spray areas far removed from point of take-off
Invalid response - Probably more to do with money
Yes - Money=equipment=personnel
Yes - Larger A/P facilities are less effective. As I have said in A3 at YYZ we line up to get sprayed then line up to T/O.
Yes - Deice crews are better trained at large airports. However availability of deicing space is not as easy.
Yes - Type IV fluid is only at a few airports & airports like YWG could really benefit from having Type IV fluid
Yes - Smaller airports can be very unuser friendly for deicing, it can be extremely inconvenient to deice and worse it can be impossible
No - Where I operate de/anti-icing service is provided when necessary
Yes - Obviously smaller airports have limited equip. & fluids causing longer deice times -however if guidelines for specific conditions are k
Yes - When you are #30 for T/O even Type IV can fall short
Yes - Small airports often have only Type I and small deice vehicles that take too long to complete the deice procedure
No - Familiarity with procedures on aircraft type affects the quality of service
Yes - Often smaller airports are more coordinated, although they may not have Type II fluids
No - Some airports with less exposure to winter conditions, ie. southern states (ATL) could use help
Yes - At Small airports a cherry picker (3 wheels) takes 10-15 minutes to move about the A/C. Where is Transport to outlaw the junk
Yes - Standard procedures should be improved from INT'L airport vs. Regional airports
Yes - Smaller airports do not hold Type IV "Ultra"
Yes - Munich airport has deice gantry right at holding point
Yes - Too small= no Type IV Too big= departure line ups hurting holdovers
Yes - Smaller stations use to carry only Type I fluid while bigger ones have Type IV
Yes - Smaller airports generally do not keep the equipment well maintained (constant failures of equipment is common)
Yes - Smaller airports we serve have extremely slow equipment causing lengthy delays. In light icing conditions, less likely to call for deicing
Invalid response - Only major airports visited so unable to answer
Yes - Smaller airport= less traffic therefore off ground faster (exception CYLW where there are frequent IFK ground delays)
Yes - Generally the large airports do a better job - more equipment, more expertise

Yes - Smaller and less congested, the better the job and few delays to runway
Yes - Big airports (YYC, YVR, YEG, YYZ, YUC, etc.) have all the equipment. I have had ground personal try and deice with what amount to garden...
Yes - Although Vancouver is a glaring exception
Yes - Big airports (YYZ) are unable to cope with deicing
Yes - i.e.: YQT only has Type I for our operation
Yes - More flexibility at smaller airports where aircraft could be deiced at the departure end of runway, less ATC conflict with process
Yes - Insufficient resources at YVR & YYC
Yes - The larger the airport the harder it is to be deiced when it is really needed. On the other hand small on-line stations have bare equipment
Yes - As above, not enough resources/deicing areas and poorly organized
No - Some of our smaller airports do not have Ultra though
Yes - Bigger A/P better equipment
Yes - The bigger airports provide seemingly a more efficient process but the also have the problem discussed in A3 above
Yes - Same as A1, Many smaller airports have poorly trained or untrained deicing personnel
Yes - Standards are very high at YZ,VR,UL,WG. Small stations have no one watching them and therefore establish their own standards
Yes - We have full to service in YYZ but all outbases (incl. YXU) have basic deice. YOW & YUL have better service available
Yes - Smaller airports= much more "personal"/timely servicing
Yes - Amount of time on ground prior to departure - delays in ATC clearance at uncontrolled airports
Yes - Although large A/P will give good service, subject to queuing delays, large A/P also equates long taxi and subsequent holdover concerns
No - Occasionally smaller airports can't have variety in types of deice fluids
No - Some large A/P's have poor service due to poor company policy
Yes - Smaller regional airports naturally do not have the same equipment as larger ones
No - Our company provides adequate service anywhere we go
Yes - The larger the airport, the longer time usually elapsed from deice to take off point
Yes - Lack of equipment at small airports
Yes - Bigger airports & better equipment but delays are terrible
Invalid response - I only operate to major airports
Yes - May not have Type II or IV
Yes - Due to taxi times
Yes - It seems the bigger the A/P the worse it is. Take YVR for e.g.. deicing is quite a long show. The spend 400 million on a new A/P w no imp
Yes - The smaller A/C in remote locations have very little or no services
Yes - Small airports sometimes ineffective deicing units
Yes - Some smaller uncontrolled airport facilities require improvements
Yes - Small airports lack adequate equipment
No - Some of the best deicing is done at my airlines smaller airports
No - Vancouver is ill-equipped for icing operations
Yes - Deicing bays
No - Small airports Type I only, airborne quickly - large airport, busy Type I & II
No - Some big airports are not set up properly. Vancouver is a glaring example
No - I serve only large airports
No - Affected by service provider equipment & level of training
Yes - Smaller line stations have older more rudimentary and much slower equipment (travels slower and sprays less fluid volume)
Invalid response - N/A I just fly into the larger ones
No - Some of the small airports with very conscientious employees are actually better than the large airports
No - Not really; it's more the crew monitoring/applying the fluid
Yes - Larger airport - more delays. Smaller airport - less delays
Yes - All types of fluid not necessary at all airports
Yes - Smaller airports sometimes unable to apply fluid fast enough to beat holdover times if precipitation is heavy enough
Yes - Smaller fields no anti-ice
Yes - Some airports don't have as good a selection of fluids
Yes - Smaller airports (private deice operators, instead of company) can be less professional
Yes - Some airports (many) still with only Type I fluid
Yes - Smaller airports and operators still tend to discourage the pilots, who do the deicing to complete the process
Yes - Delays, congestion
No - Only fly to large airports in Canada
No - Denver Int'l is one of the best. They have very good procedures and can deice many A/C at the same time
Yes - Larger the airport the longer the ground relays. e.g.: YY2
Yes - Smaller stations sometimes have very slow equipment. Then again, large stations can have lengthy delays, especially YVR which is poorly
Invalid response - Don't know; only operate from one airport in Canada
Yes - Larger airports are unprepared for volume of aircraft
Yes - Better spray service in general, but often longer holdover required before take off
Yes - Sometimes being a connector you receive secondary treatment
Yes - At small airport you may be the only flight and receive excellent service - not so at large airports
Yes - Facilities
Yes - Large A/P should have deicing facilities at the end of rwy's or close to them
Yes - Generally bigger is better due better resources/organization

No - Although at FSS controlled airports or with flow control deice timing is difficult to judge
Yes - Larger airports take longer to reach T/O position e.g.. YYC runway 34
Yes - Smaller airports - decreased delays in getting airborne - less chance of exceeding holdover times
No - Our standards equal throughout system in North America
Yes - Bigger A/P have better fluid types
Yes - Larger equipment can finish the job more quickly
Yes - Northern Ontario gravel strips are poor to none
Yes - Not all airports have all fluids
Yes - Deice equipment at smaller airports at times very poor & unreliable
Yes - Some smaller stations don't have as much equipment but personnel are good
Yes - The larger the airport the greater the taxi length & congestion/confusion on "icy" days
Yes - Larger trucks on major airports but delays due to shortage of equipment
Yes - Deice pads should be located at end of each runway - making holdover time almost a non issue
Invalid response - Limited exp. in flying into smaller airports
Yes - The smaller airports sometimes have inferior or unreliable equipment
Yes - Smaller airports don't have Type II therefore holdover times are more critical. Especially DC-9 with cold coated phenomena!
Yes - Smaller airports do not as readily have Type II (however due to shorter waits for take off it is rarely needed)
Yes - As well the service provider or contractor, ie. lowest common denominator
Invalid response - I only fly into large airports YYZ, YVR, YYC
Yes - Less type of fluid small regional airport
Yes - Large A/P delay from deice centre to T/O runway
Yes - Smaller airports (e.g. Deer Lake) have smaller equipment and deicing a DH8 can take 10-15 min - hope your holdover time is great
Yes - 1. Type 2,4 fluid not avail. at many small airports 2.Equip in use often inadequate to deice quickly enough to dep. within HOT for Typ1
Yes - Not all airports have all types of fluids

B. PILOT EXPERIENCE

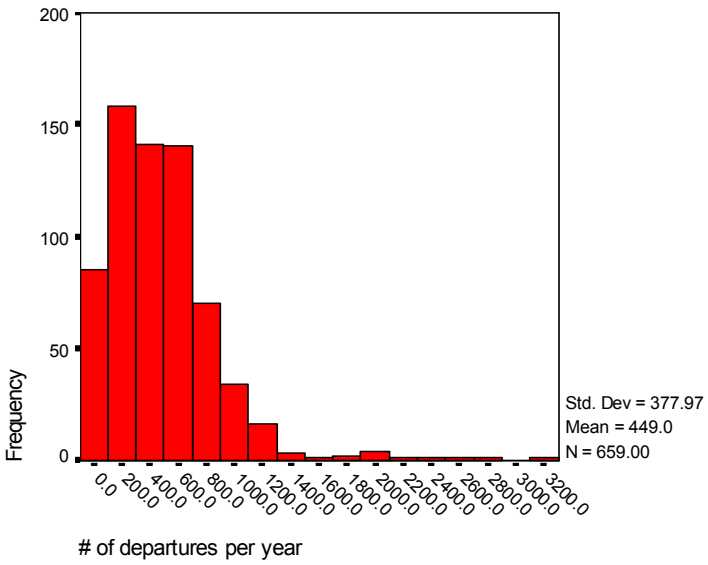
B1. Please indicate the configuration of aircraft you currently fly:

Type of aircraft you currently fly

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Twin Turboprop High Wing	119	16.7	16.8	16.8
	Twin Turboprop Low Wing	19	2.7	2.7	19.5
	Twin Turbofan - Max 70 pax	75	10.5	10.6	30.1
	Twin Turbofan - Max 150 pax	263	36.9	37.2	67.3
	Twin Turbofan - Over 150 pax	112	15.7	15.8	83.2
	Three Turbofans	32	4.5	4.5	87.7
	Four Turbofans High Wing	19	2.7	2.7	90.4
	Four Turbofans Low Wing	64	9.0	9.1	99.4
	> 1 of above responses	4	.6	.6	100.0
	Total	707	99.3	100.0	
Missing	System Missing	5	.7		
	Total	5	.7		
Total		712	100.0		

B2. How frequently do you fly:

(a) No. of departures per year



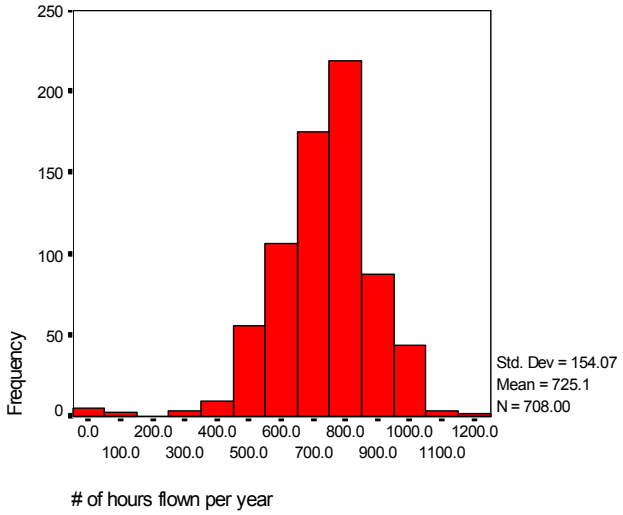
Report

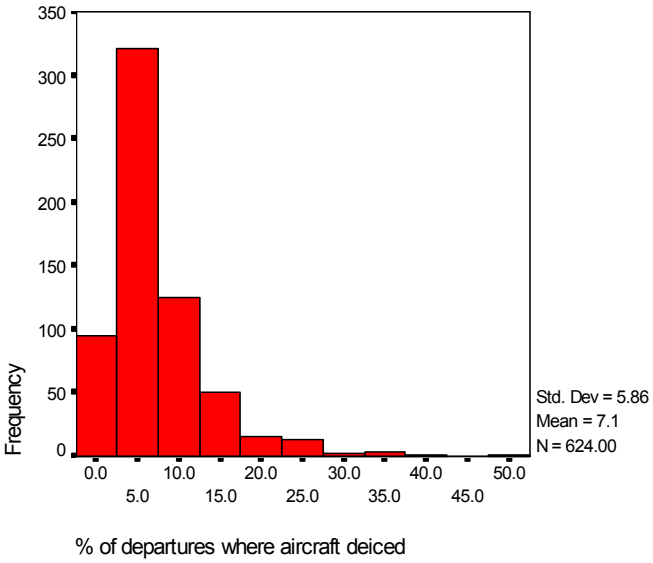
Type of aircraft you currently fly		# of departures per year	# of hours flown per year	# of times aircraft de-iced last winter	# of times aircraft re-deiced due to TO delay	Years a commercial pilot	% of departures temps 0 or less
Twin Turboprop High Wing	Mean	709.6	736.7	31.9	1.4	14.9	37.1
	N	115	119	116	111	118	117
Twin Turboprop Low Wing	Mean	1372.4	931.6	63.5	3.1	8.8	41.8
	N	17	19	17	17	19	19
Twin Turbofan - Max 70 pax	Mean	657.3	772.4	32.9	1.3	14.6	36.6
	N	72	75	73	73	75	75
Twin Turbofan - Max 150 pax	Mean	395.0	712.0	25.2	.5	21.6	36.5
	N	242	263	254	261	262	256
Twin Turbofan - Over 150 pax	Mean	177.4	714.8	15.0	.4	25.7	32.4
	N	96	109	106	108	112	111
Three Turbofans	Mean	271.8	682.8	14.9	.7	22.3	21.4
	N	31	32	31	31	32	32
Four Turbofans High Wing	Mean	543.9	661.6	24.4	1.4	18.2	31.2
	N	18	19	18	19	19	19
Four Turbofans Low Wing	Mean	96.4	706.3	8.0	.2	26.9	23.8
	N	61	64	64	63	64	64
> 1 of above responses	Mean	1487.5	737.5	38.5	3.0	15.8	47.5
	N	4	4	4	4	4	4
Total	Mean	449.6	725.9	24.5	.8	20.4	34.2
	N	656	704	683	687	705	697

Are you comfortable with de/anti-icing procedures in use today * Type of aircraft you currently fly

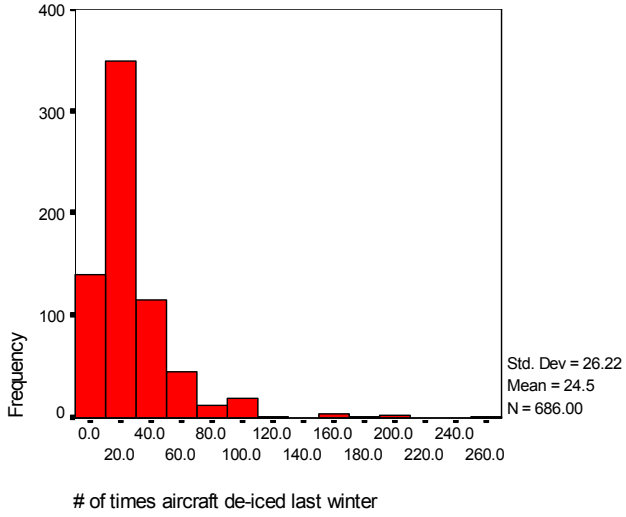
			Type of aircraft you currently fly									
			Twin Turboprop High Wing	Twin Turboprop Low Wing	Twin Turbofan - Max 70 pax	Twin Turbofan - Max 150 pax	Twin Turbofan - Over 150 pax	Three Turbofans	Four Turbofans High Wing	Four Turbofans Low Wing	> 1 of above responses	Total
Are you comfortable with de/anti-icing procedures in use today	Yes	Count	90	15	57	222	86	24	12	53	3	562
		Col. %	76.9%	78.9%	78.1%	85.1%	79.6%	77.4%	63.2%	84.1%	75.0%	80.9%
	No	Count	27	4	15	39	22	7	7	10	1	132
		Col. %	23.1%	21.1%	20.5%	14.9%	20.4%	22.6%	36.8%	15.9%	25.0%	19.0%
	> 1 of above responses	Count			1							1
		Col. %			1.4%							.1%
Total		Count	117	19	73	261	108	31	19	63	4	695
		Col. %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

b) No. of hour flown per year





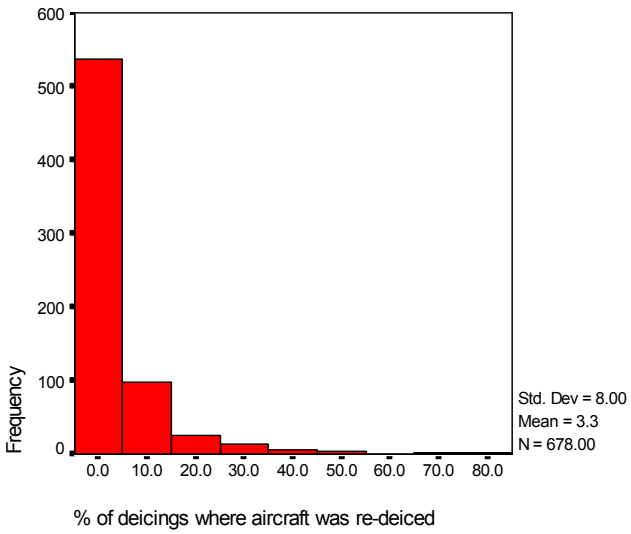
(c) No. of times your aircraft was deiced during last winter



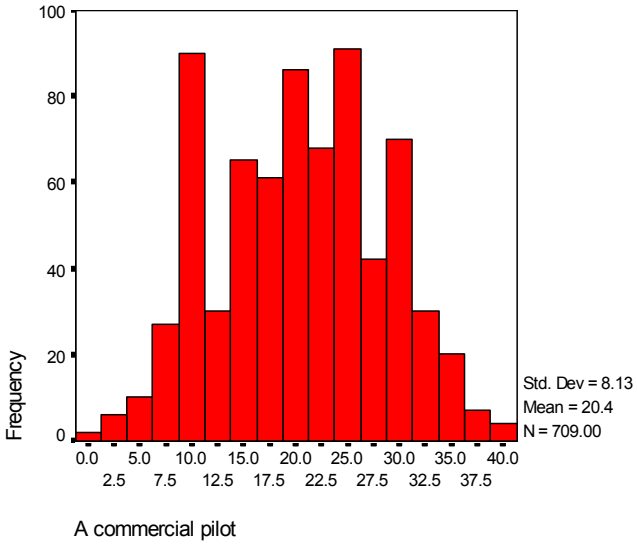
(d) No. of times your aircraft was re-deiced last winter due to delay in take-off

# of times aircraft re-deiced due to TO delay

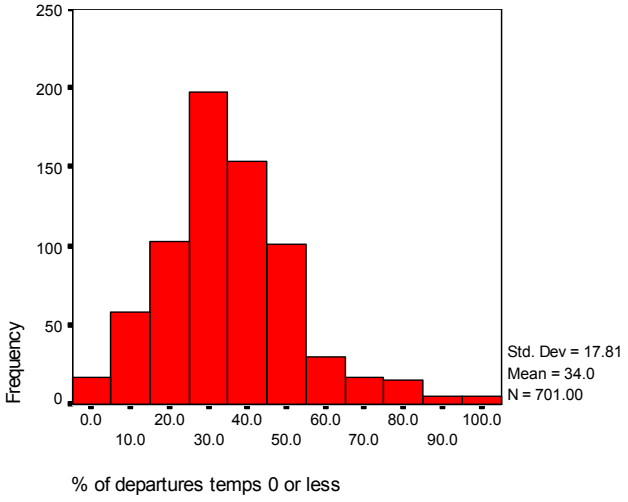
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	489	68.7	70.8	70.8
	1	90	12.6	13.0	83.8
	2	68	9.6	9.8	93.6
	3	20	2.8	2.9	96.5
	4	5	.7	.7	97.3
	5	6	.8	.9	98.1
	7	1	.1	.1	98.3
	10	6	.8	.9	99.1
	13	1	.1	.1	99.3
	20	3	.4	.4	99.7
	25	1	.1	.1	99.9
	40	1	.1	.1	100.0
	Total	691	97.1	100.0	
Missing	System Missing	21	2.9		
	Total	21	2.9		
Total		712	100.0		



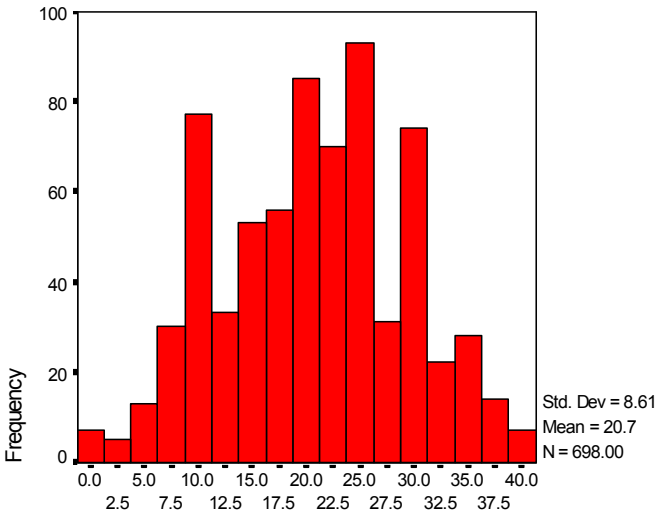
B4.(a) How many years have you been a commercial pilot?



B3. Approximately what percentage of your departures last year were made under near or sub-zero temperatures (OAT)



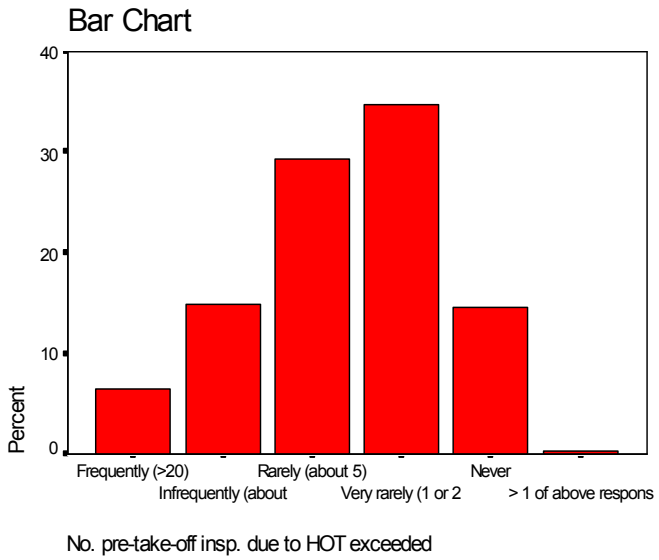
B4.(b) How many years have you been operating in areas subject to ground icing?



B5. During the past <u>two</u> winter seasons when you have been part of the flight crew, how frequently have pre-take-off inspections been necessary because take-off could not be attempted before the HOT expired

No. pre-take-off insp. due to HOT exceeded

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequently (>20)	45	6.3	6.4	6.4
	Infrequently (about 10)	105	14.7	14.9	21.2
	Rarely (about 5)	207	29.1	29.3	50.6
	Very rarely (1 or 2 times)	245	34.4	34.7	85.3
	Never	102	14.3	14.4	99.7
	> 1 of above responses	2	.3	.3	100.0
	Total	706	99.2	100.0	
Missing	System Missing	6	.8		
	Total	6	.8		
Total		712	100.0		



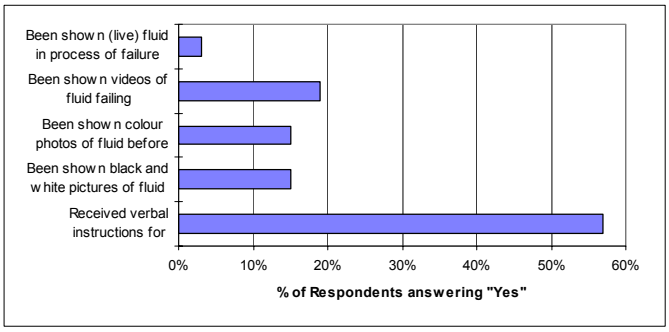
No. pre-take-off insp. due to HOT exceeded * Type of aircraft you currently fly Crosstabulation

	No. pre-take-off insp. due to HOT exceeded												Total	
	Frequently (>20)		Infrequently (about 10)		Rarely (about 5)		Very rarely (1 or 2 times)		Never		> 1 of above responses			
	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %
Twin Turboprop High Wing	12	10.3%	26	22.2%	40	34.2%	30	25.6%	8	6.8%	1	.9%	117	100.0%
Twin Turboprop Low Wing	2	11.1%	2	11.1%	6	33.3%	6	33.3%	2	11.1%			18	100.0%
Twin Turbofan - Max 70 pax	15	20.0%	19	25.3%	25	33.3%	11	14.7%	5	6.7%			75	100.0%
Twin Turbofan - Max 150 pax	8	3.1%	35	13.4%	81	30.9%	102	38.9%	35	13.4%	1	.4%	262	100.0%
Twin Turbofan - Over 150 pax	3	2.7%	12	10.7%	26	23.2%	50	44.6%	21	18.8%			112	100.0%
Three Turbofans	2	6.3%	3	9.4%	10	31.3%	14	43.8%	3	9.4%			32	100.0%
Four Turbofans High Wing	2	10.5%	3	15.8%	4	21.1%	6	31.6%	4	21.1%			19	100.0%
Four Turbofans Low Wing	1	1.6%	3	4.7%	12	18.8%	25	39.1%	23	35.9%			64	100.0%
> 1 of above responses			2	50.0%	2	50.0%							4	100.0%
	45	6.4%	105	14.9%	206	29.3%	244	34.7%	101	14.4%	2	.3%	703	100.0%

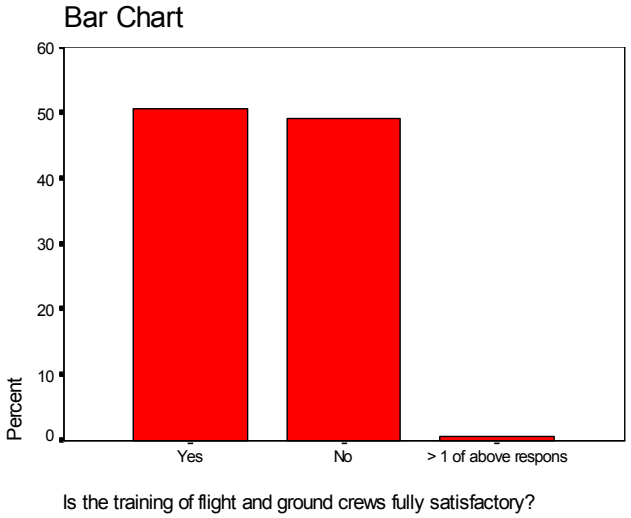
C. CONFIDENCE

C1. During your training for ground icing, have you:

Type of Instruction	Yes	No
Received verbal instructions for recognizing fluid failure	57%	43%
Been shown black and white pictures of fluid failure	15%	85%
Been shown colour photos of fluid before and soon after fluid failure	15%	85%
Been shown videos of fluid failing	19%	81%
Been shown (live) fluid in process of failure	3%	97%



C2. Is the training of flight and ground crews fully satisfactory?



Comments:

No - Photos and videos of fluid failure
No - Have found several instances of complete lack of understanding of deicing task
No - No suggestions. But no because as the season progressed crews seemed much more smooth/familiar than at the beginning of the season
No - With reference to the above question I have not received training to accurately tell (usually) if a fluid has failed.
No - More on fluid failure
No - More visual training
No - Spend money to increase time spent training??
No - Our program is a joke. Just a quick blow over to tell T.C. we've done it.
No - Photos and videos of fluid failure
No - The valid concept of light dry snow on clean is ignored for "legal reasons"
Yes - Both are satisfactory however more emphasis should be placed on training ground crew rather than flight crew
No - No consideration of cold soak on top of wing due to low temp fuel in fuel cell. Wing could be OK while T-Tail frosted
No - At our airline either the ground or flt crew can call for a spray. The term adhere is not fully understood. We tend to spray when not necessary. Sometimes this actually causes a problem because when it is
No - As stated in question C1 training should include photos, film & lecture from Co. which developed the deicing products
No - Co. approved to administer take home exam on deicing section of FOM. The exam has been the same for 3 yrs, I don't feel it's adequate
No - Ground crew too conservative
No - Many ground crews overdo deicing on area not required & many flight crew don't challenge the decision of ground personnel to deice
No - See C1
No - Should be shown videos pictures in CI
No - Wouldn't mind receiving instruction/viewing photos/videos of C1 above
No - I have never had a briefing on fluid failure
No - Better training for recognizing fluid failure
No - Ground crews still don't understand: who has final decision, that a little ice not acceptable, that the tail has to be inspected in addition to the wing and not infer it's condition based on observation of
Yes - But refresher documentation usually arrives after the first frosts & snows
No - Show fluid failure
No - Videos could be shown during annual recurrent training
No - There seems to be some confusion with ground crews as to when HOT starts
No - Contracted ground crews seem very weak in training. I would like to see training on (C1) of questionnaire

No - Flt crews be provided with full colour photos in ops manual Ground crew get overtime for extra deicing & they cannot be overruled by PIC. They will insist on deicing dry powder -40C that is not adhering
No - All the areas in C, need to be addressed
Yes - Always a learning curve
No - Would like to be shown videos demonstrating fluid degradation/failure during various weather conditions on precipitation
No - The degree of icing awareness is very high. The degree of common sense involved has decreased. We now deice wings that essentially clean
No - Ground crews need more training at small airports
No - See C1
No - See above. Mostly depend on HOT for guidance and some written information in our ops manuals.
Yes - For experienced crews
No - The above question about fluid failure has never been properly addressed
No - Do not totally trust ground crew
No - More informational/instructional flyers
No - Ground crews require more training and standardization (application, fluid type, start of HOT)
No - More hands on required
No - Smaller airports should require the same standards as larger airports
No - See answer to C! above. All other training is self taught
No - 1
No - With regards to flt crew, written training/annual info is excellent and thorough. Personal discipline req'd to ensure you know it but really not much follow-up or training classes
No - See question C1
No - Less theory and more practical life situation, examples, stories, videos, etc.
No - Deice crews should be encourage to perform tactile inspections where clear ice can exist on critical surfaces
No - Training on fluid failure
Yes - Usually we receive a lengthy winter OPS handout in Sept/Oct. It discusses deicing procedures, fluids, new products etc.
No - More info (visual) on fluid failure
No - More technical data as well as more visual instructions as in C1
Yes - Fluid failure is a new term to me
No - No training for pilots to show fluid failure. Ground crews not getting enough recurrent training using inconsistent verbal calls to pilots
No - Define fluid failure
No - Because of the previous question C1 we need better training in recognizing fluid failure
No - Extensive training to crews prior to the icing season (not in July). Better training course for ground crews
No - Recognition of fluid failures under poor lighting conditions as stated in question C1
No - Too much emphasis on icing/deicing this overshadows other training
No - Should be aware of recurrent training
No - Pilots - no training on fluid failure. Ground crews are trained to deice if there is a snowflake within 100' of the airplane - a terrible waste of time and resources
No - Training frequency and ground handlers
Yes - Not aware of ground crew training aspects
No - Have ground crew follow pilot around
Invalid response - See C1
No - Deiced by request of ground crew often when not req'd. i.e. Clean wing on ldg'n -18C OAT light snow falling: not adhering to wing but ground crew called for deice
Invalid response - Yes for Canada - no for the US Please read magazine (2 months ago) Flying Blind, the yanks are totally dangerous in every aspect of aviation as well as unprofessional
Yes - Repeat use of training material makes it very boring, if there's nothing new to teach spare us the formality of recurrent training just to fulfill a MOT mandate
No - For the reasons in C1
No - No worldwide standards and training
Invalid response - Not familiar with their training
No - i.e. Fluid failure videos
No - Hands on would be nice or at least videos
No - Increase communication between ground & flt crews regarding type of fluid + if overspray was applied
No - Review fluid failure
Yes - I believe there should be someone sent preferably a pilot on a good course to obtain all necessary info to teach on the same levels. Need more emphasis on deice failure recognition
No - Annual recurrent training does not address this
No - See previous question
No - I think flt crews need minor supplemental training and ground crews need major supplemental training
No - No training given on surface "fluid failure"
No - Needs to be more operational & tailored for flt crew. Found training to be too general and sometimes impractical
No - Reference to C1 above, more visual training req'd
No - How about videos on fluid failure? Send to pilots to view at home
No - See C1, I never received training on fluid failure
No - See C1
No - Poor fluid failure recognition
No - Include more technical data. Be aircraft specific
No - We need to be briefed on fluid failure
No - I am satisfied but improvements could be made in fluid failure recognition (see above question)
No - Need more info on failure of deicing fluid
No - Combined ground & flt crew training
No - Flt crew training in fluid failure/ ground crews better communications training
No - Produce a minimum standard booklet for all, and make its review in ground school an annual requirement
Yes - Fully satisfactory suggests almost perfect. Training is satisfactory
No - Would like to see more material that shows surface deteriorating to an unacceptable level
No - Video of CI would be helpful

Invalid response - Many ground crews do not understand the basics of why you require a clean wing, other than A/C might crash e.g. OAT-15C, light snow falling; A/C wing clean accept for some patchy loose snow.
No - Ground crew training varies greatly, particularly at smaller airports where ground personnel seem to lack an understanding of the importance of HOT
No - I found that ground crews are not well versed on the location of rep. surfaces & often begin deicing ad-hoc
No - Ground crews at smaller less utilized airports could use better training
No - Reference previous question, videos of fluid before & after fluid failure. More visual training
No - Should be shown videos of fluid failure
No - As mentioned in C1 videos of failing fluids would be very informative
Invalid response - Not familiar with ground crew training
No - See C1 would like to see live
No - You can't be sure of wing condition by looking out the window, what about the tail/fuselage
No - Flt crews OK but ground crews need more instruction on when deice not required. E.g.. cold wing, dry snow on wing (small amount)
Yes - See above
No - RE: C1 obviously some training is lacking
No - Ground crews only trained to min standards to put on fluid no training to initiate or observe whether airframe should be deiced
No - They are not consistent in advising start of spray and what time & type of fluid used
No - As per C1 I would like to see pictures of fluid failure
No - What is fluid failure? If you mean fluid not doing its intended function i.e. no longer preventing ice/snow buildup then OK
No - Mostly yes, however, one area of increased training might be mutual understanding of each others limited or difficult areas of observation
No - As with tasks of this nature, classroom instruction provide little memory retention. Practical training would help
No - Should see live fluid failure if never been seen before in actual conditions
No - Apply & enforce the same standards to commercial operators of small aircraft
No - See C1 I would like to see info on fluid failure, etc.
No - Ground crews particularly new hires don't always get good training to male up for lack of experience in recognizing varying type of icing conditions & how to properly deice A/C particularly at smaller A/P
No - Ground crews need more training
No - Only written communication is available
No - Obviously question C1 indicates I could trained on fluid failure
No - Ground crews should never deice A/C in FZRA at gate without Captains approval- I once asked Ground Crew type of fluid & was told Type 1-50%
No - As seen above, having some more instruction on fluid failure would be good
No - The so-called training for flt attendants has resulted in fear, uncertainty, reduced confidence in pilots. This could have been much better handled by putting the training into context. i.e. theory of
No - On some occasions ground crews have been over-zealous deicing when not required
Yes - I do know about all ground crews
No - As per C1
No - Would like to see, hear industry experts' presentations instead of personal opinions of inexperienced staff pilots
No - Training does not address common sense, discretion & professionalism It is rote & therefore can be dangerous
No - In most cases some areas need more servicing
No - Fluid failure
No - A more thorough course should be implemented with more technical points reviewed (Not just shown on video)
No - Show (live) fluid failure
No - As above I have had no training for recognition of fluid failure
No - To the extent of the preceding question training should be improved so that I may answer yes to most of those questions
No - Ground crew frequently display a misunderstanding of airflow/airfoil characteristics and deice inappropriately
No - Would like to see the above included C1
No - Less catering to covering regulatory items and more attention to practical in the field real world situations is required
No - Have come across some ground crew not experienced at all
No - I personally should improve my knowledge of recognizing fluid failure
No - Course should include visual representation of fluid failure etc.
No - Videos as above - pictures are worth a thousand words
Yes - I can't comment on ground crew training
No - Contract ground staff not trained to standard. Previously demonstrated a failure to completely deice upper tail surface
No - Above videos
No - The area of fluid failure?
No - See C1
No - Standardizing operations especially at smaller stations
No - Ground crews are not consistent about half do not follow the S.O.P.s re: the communications with flt deck
No - Demonstration aircraft should be hosed down with water in sub-zero temp. & then deice and inspected by class
No - Some (contract) ground crews could be trained more regarding fuselage deicing on tail-mounted Eng. A/C (e.g. DC9)

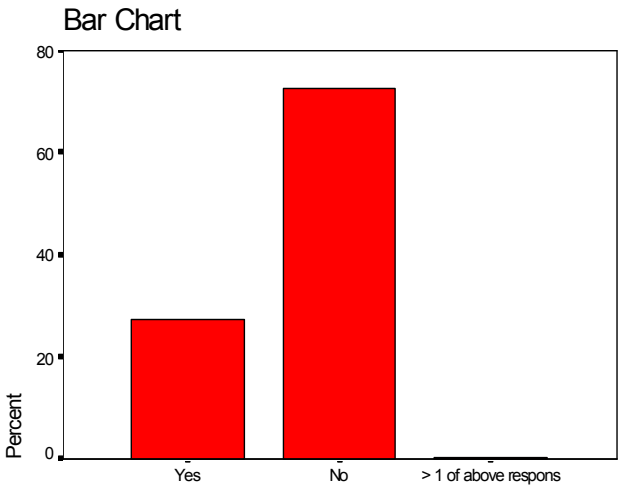
No - Not aware of availability of photos about fluid failing, would be nice to be shown these photos
No - Instruction + videos of fluid failure as detailed in C1 above
No - It has been my experience that quite often Ground crews don't fully understand & appreciate the necessity of a completely clean A/C or follow Co. S.O.P.'s for anti-deicing
No - As per C1
No - Better demonstrations of fluid failing (i.e. videos, pictures etc.)
Yes - Don't have knowledge of ground crew training
No - I guess I need some info on fluid failure
Invalid response - I guess not
No - Vancouver
No - I believe ground crews are not given sufficient training, we overspray
No - Lack of coordination between ground and flight crews regarding requirements and procedures
No - I guess they should show pictures of fluid failure
No - Visual picture (still or video) made available regarding question C1 If currently available during training - they were of little impact, I do not recall seeing any
Yes - Although borderline adequate
No - As mentioned above fluid failure was not shown
No - Training is exam based and should be briefing based
No - Could be shown examples mentioned above
No - Need more photos or videos taken in actual conditions i.e. at night & reduced visibility
No - Still lack of standardization between ground & flt crews & between airports. Radio frequencies not always current
No - Ground crew waste lots of time & money (fluid) deicing non lift (wing) producing area (fuselage aft of engines)
No - After answering no to C1, I guess more could be done. However my past training in icing has been very good
No - Would like to see items answered NO Question C1
No - Our course seems to be laid out with the ground deicing crews in mind not for pilots
No - According to C1 no, All items in C1 above could be used in recurrent training
No - Present material as in C1 above
No - I don't recall training to do with fluid failure, as noted in C1, I learned on the job and with common sense
No - See C1
No - It is in all cities except Vancouver. It seems deicing is done so seldom that the deicing procedure is a great mystery to them
No - Ground crews need more training, sometimes spray tail first don't start spraying rep. area first tell holdover start time from own wristwatch which often different from A/C clock(they tell after spray finish
No - Recognition of fluid failure could be taught more
No - As indicated in C1 some areas of training are missing important info suggest these items be required
No - Pictures of above
No - Flt crews require more in-depth + performance related training & ground crews are just beginning to show some practical knowledge of why & when aircraft are deiced
Invalid response - Certain airports (small)
No - See C1 above
No - Sometimes Ground crews don't realize the effect of what a little bit of ice could do, but won't hesitate to deice when only a bit of dry snow is falling & blown away by the winds
Yes - As flight crew training fluid failure training lacking
No - A self-study exam is not sufficient, this only serves to satisfy regulators, not to gain true knowledge of the subject
No - Needs to be more communication between deicing crews & flt crews. Also it has to be imperative how important holdover times are
No - See C1 above
Yes - Except for fluid failure
No - See C1, ramp to flt deck communications prior + post spray is vital to confirm fluid types & possible concerns
No - More instruction on importance of HOT & improved visual communications skills would be beneficial
No - Better knowledge of fluids needed
No - I don't recall seeing pictures or recognizing fluid failure
No - Needs to be more interactive, all previous training has been watching the same dull video & 15 min crash course on icing which has never been taken seriously
No - Underwing frost (7 1/8) and ice is often missed during inspections by ground crew
No - More info regarding fluid failure
No - See above, inadequate training of how to assess and detect fluid failure
No - More practical training
No - Smaller stations need improvement
Yes - Crews yes
No - Refer to C1
Yes - Ground crews are not trained to a high std. They do not understand the process
No - Ground crew wanting to spray on a dry cold wing due snow accumulation, flt crew cannot override
No - Reference my answer to question C1
No - Should be more on fluid failure. No classroom instruction only a written exam
No - Ground crews should be made aware of the necessity for clear communication standards
No - More actual visual training is needed
No - See C1
No - Deicing training generally consists of being handed an exam with an answer key and a deadline to re-submit to flt ops
No - Ground crews need better training
No - Used at some airport so infrequently that sometimes SOP is forgotten or not followed exactly
No - See C1 above
Yes - The experience factor of all concerned far more important than the regulatory side. Training can only take you so far
No - Last 2 years I've done mine in Aug.

No - Ground crew totally spooked & overzealous about deicing. If more than 3 snowflakes in air they use their power & mandate deicing at horrible unnecessary cost
No - Poor vis. at night, rain or snow etc. & we are expected to determine through a window or door (75-100' away from the leading edge) if wing is OK. A lawyer's way of always being able to blame pilot
No - Need pictures of fluid failure
No - See above
No - Better ground schools by company
No - See C1 above
No - See question above, otherwise yes
No - Exams are too simple, do not foster study, comprehension
No - Not if I didn't know/recognize fluid failure
No - See above. More info could be available to crews to familiarize them with fluid failure
Yes - It is for our company but clearly not for others
No - We see a video only - Show & discuss fluids - talk about real life examples, problems
Yes - Overkill because of poor procedures at the lower level of aviation
No - Overkill! Using a fire hose on a frost covered wing!
No - Hudson General in YYC are useless
No - There is always room for improvement as more info becomes available
No - Ground crew training inconsistent
Invalid response - I would have said so except for above
No - Explain exactly what conditions you can operate into - e.g.. freezing precipitation
No - Crews should be shown live fluid failures
Invalid response - Training is only a good beginning
No - Ground & flight crew training should occur in conjunction with one another
No - The Transport Canada film "when in doubt" is absolutely useless. Something like the points in C1 would be more useful
No - Don't remember if received training re: fluid failure
No - I wish I could identify fluid failure with better confidence
No - I would like to see more videos on deicing because it is something we don't do an awful lot & would be very beneficial to a safer operation
No - A short colour video on all aspects of de/anti-icing procedure complete with observations of fluids failure would suffices
No - I wouldn't mind more info on recognizing fluid failure
Invalid response - Mostly - A world standard on procedures for large/small/prop/turbo aircraft should be accepted and taught
No - Pictures of fluid failure might help. The joint TC/First Air deice film I have seen 6 years running is stale, leads to inattentiveness
No - Still misunderstanding for deicing at -25 C or colder makes it worse
No - Need more ground school instructors
Yes - Although changes to A/C spray route are not always relayed to ground crew - different A/lines with differ mandates
No - Simplify
No - Wish to see a film on how the fluid behaves when the aircraft takes off with and without snow accumulation on top of the fluid
No - Video need to be updated. Many videos are 20 years old. Fluid failure must be taught. Pilots along with cabin crew should take icing training together
Yes - Generally ground crew performance of deice procedures is good, however we have no way of determining if the training they received is satisfactory
No - C1 above, pre-take-off visual inspection next to worthless in most cases
Invalid response - More time spent discussing fluid failure of the types issued at each individual airport used by the operator
No - Maybe explain "failure"
No - For flight crews photos and/or videos could be helpful. Ground crews sometimes have a cavalier attitude to icing
No - Visual presentations such as internet or home video would provide greater insight
No - Ground crew in USA (contract) are spraying indistinctly in APU intake, flap actuators, etc., causing other problems
No - Pushback crew is often elsewhere when deicing is completed when only 6-15 min HOT is available with Type I. When only the wings are contaminated they insist on spraying the whole aircraft
No - Hands on training - a picture is worth a thousand words for those that are not experienced
Yes - Better training (visual) on clear ice recognition and fluid failure
No - Action above (C1) thru items
No - Have seen cases where ground crew have forgotten to deice parts of A/C improved training needed
No - "Fluid failure" is not taught
No - I have never seen wind tunnel tests on a wing covered with ice. Perhaps others have not either, and might be more vigilant in icing conditions if they had
No - Ground crews universally do not seem to grasp the significance of contamination on non-lifting surfaces. Even some flight crew, seem to think that clean wings & tail is good enough with a load of snow on
No - It is still impossible to take a minimum wage/unskilled worker with no maintenance or piloting experience and turn them into deicing "experts" with the bare bones training received
No - Ground crews are reluctant to do tactile inspections for ice under loose snow - they prefer to do "snow removal by deicing fluid'. Give me a ladder - I'll do it!
No - What is "fluid failure"? A new "BUZZ" word!
No - Have seen none of the above
No - Provide pictures, video's in self briefing areas for private pilots, mandate part of the annual recurrent training for airlines

No - This survey is the first time I have heard of there being any systematic concern for identification fluid breakdown
No - Less emphasis on need for a "clean wing", and more on above and holdover times, etc.
No - Ref C1: If fluid failure is difficult to assess, maybe some pictures would be useful
No - See C1
No - No fluid failure training
No - Always room for improvement
Invalid response - I would like to see colour photos of fluid before and soon after failure or videos of fluid failure
No - More pictures or videos
Yes - Yes for aircrew in rep. to C1, perhaps ground crew would require this training
Yes - Can't really give an option on ground crew though
No - More videos on C1
No - But not bad
No - Under extremely cold conditions, i.e.: YWG at -33 & colder, deicing "paranoia" has resulted in some flt crews deicing to remove an ice haze not frost & putting deicing fluid on a wing near its freezing
No - Especially at smaller stations ground crews must be closely supervised. I have had them begin deicing too early and starting with the tail
No - See above - knowing how to recognize fluid failure would be useful
No - Require video
No - Very little mentioned about operations at temps just above 0 C with a wet wing. Need more info regarding temperature drop during take off roll
No - Knowledge of cold soaked wings & type of deice fluid required is often not known by ground crew
Yes - Excellent standard
No - There still exists some lack of understanding of clear ice over cold soaked fuel tank. i.e.: nearly impossible to detect without tactile inspection & that it has occurred in temps as high as +14 C!!
No - Often "requirement" for training is satisfied by a short verbal briefing with no hands on experience or visual presentation
No - Add the training required for to have answered "yes" to the above questions (question C1)
No - The above question indicates fertile ground for education
No - Mixed training with flight crews and deicing crews
No - Ground crews appear to have been given more training than flight crew. Training for flight crew would have a larger dollar sign attached to it
No - Training is not taken seriously
No - Should be of longer duration including more time for knowledge to be put forth in the form of video, text absorption time (i.e.: not 20 min every year)
No - I would like to see fluid failure
No - Ground crews need more training in recognizing "adhering" contamination. Also don't give the holdover time to you until after spraying is complete
No - More video footage in reference to fluid failure & performance characteristics at all temperature ranges
No - Would like to see fluid failure
No - I've been spraying on the windshield, I've heard of crews being sprayed on just 1/2 the aircraft so the ground crews could do with more training
No - Our ground crews can over-ride the PIC's decision to deice. We deice many times when it is not necessary due to this procedure. eg: cold -15 C light blowing snow adhering to aircraft. Ramp says spray a
No - Ground crew knowledge is very poor using Type II when it should be used or not being prepared for deicing i.e.: fluid not heated because they didn't think it would ****
No - More visual slides/photos of fluid failure
No - Minimal effort on the part of the DOT and company should be addressed
No - Not after cleaning of fluid failure!
No - Train ground crews to understand the importance of proper techniques as well as why we have HOT and critical surfaces. Would like to see video of fluid failure
No - See "NO" items in C1 above
No - See question C1
No - See question C1
No - Read C1. Possibly train flight & ground personnel together. Deice training in July with recurrent training useless
No - Video is a good idea
No - Ground crews have to much personal turnover to become really expert
No - Look at response to C1. Obviously something in our training is lacking
Invalid response - Unknown
No - Some ground crew in YVR need a better understanding of how to deice an A/C efficiently/quickly
No - Ground crews frequently insisted on deicing A/C when unnecessary: ie. too cold or precipitation not adhering to surfaces (ie. their knowledge is insufficient)
No - Ground crew need to be more aware of aircraft type spray requirements. i.e.: top of fuselage snow removal. for rear eng. mounted A/C
No - Obviously this is the first time I have heard of fluid failure
Yes - But, must continue!
Yes - At the airline level
No - See C1
No - See section C1 above I can remember only printed material about recognizing fluid failure
No - Communications between airline and airport authorities could be improved
No - Show live fluid failure or good quality video as part of A.R.T. with different types of fluid - Type I, II, IV etc. in most scenarios possible
No - As per above, fluid failure has not been covered
Yes - ... however more data as in C1 above would enhance practical know how
No - Standardization of flt crew/ground crew communication could be improved
No - Fluid failure & examples of contamination with fluid on wing
Yes - Other than: what is fluid failure

Invalid response - Bad question...vague...full satisfaction much to difficult to categorize be more specific
No - Videos on various types of fluid available & fluid failure
No - Would like to see videos of fluid failure
No - Train both groups better and closer to time of need (ie. Oct/Nov not at ground school - at any time of year!)
No - Ground crews are not professionals the turn over is high. Learning curve is constant. Maintenance should over see, they can configure A/C for spray and have aerodynamic knowledge. Ground crews do not and
No - Show video or live fluid failure
No - Ground crew complacency and smaller stations training appears lacking
No - Sometimes ground crew not aware of importance of removal of fuselage contamination on rear mounted engine jet A/C
No - Control encroachment of administrative function into operations by de-emphasizing the visual inspection of representative surface after HOT has expired
No - Clear icing on the DC-9 was published in Company manual but nothing was mentioned in original course
No - (Ref. most C1) I would like to see pictures and video to improve training standards
No - Visual demos with contaminated surface treated by various fluids
No - Training & learning are ongoing
Yes - The above mentioned pictures might help though
No - Training in fluid failure
No - See C1 above
No - See above - fluid failure to me meant critical surface contamination
Yes - What is fluid failure" (Contamination?)
No - No instruction on fluid failure indicators
No - 1.Flight crews - more fluid failure training - live fluid failure 2. generally more extensive training

C3. In this past winter season have you had reason to question the quality or capability of deicing service provided to your aircraft prior to departing the deicing pad?



Comments:

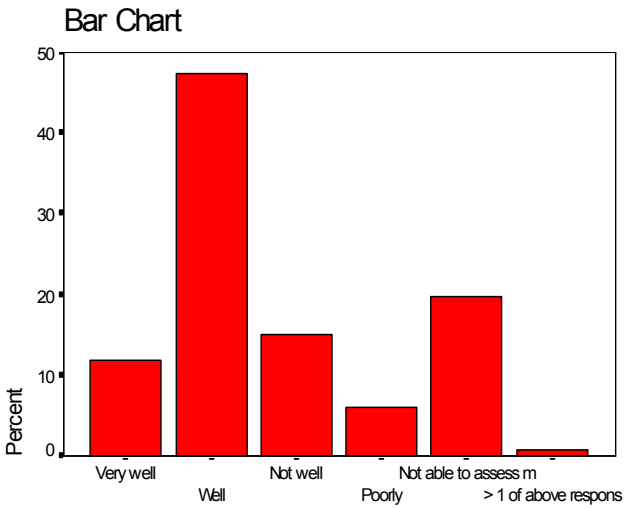
No - All crews were very competent
Yes - Complete respray
Yes - 1.Took action to ensure proper deice 2.Took action to depart without deice when not needed (Comm. with ground crew) 3.Filed incident report
No - All crews were very competent
Yes - We deiced as it was not sure if ground crew were properly experienced to assess our situation i.e. icing
Yes - Tried to explain situation to personnel involved.
No - When receiving a spray the method & quality has been satisfactory. Occasionally in the US we must observe closely the procedures being used as they sometimes are different and substandard to ours
Yes - None, Ground crew spray when not always req'd
Yes - A few times ground crew did not follow S/P, e.g. no start time, no type given. The next higher type could have be used when taxi times were long
Yes - On 2 occasions, I had to personally confirm that the tail had been deiced (USA aerodrome/personnel)
Yes - Get it done the way I wanted it done
Yes - Going outside and instructing the deicing crew on proper deicing technique
Yes - Visual inspection and had aircraft deiced again
Yes - Carefully supervised the whole thing
Yes - Occasionally it's a bit of a fight to get the crew to do the fuselage
Yes - Second inspection
No - Excellent ground support

Yes - Verbal confirmation of exact procedure used and/or request for second visual confirmation of fluid type (colour)
Yes - Delay of flight and request for additional deicing fluid application
Yes - Had to ensure that the tail was diced after it was not
Yes - Unnecessary icing occasionally, which cost my airline & environment a bundle. Nothing to be done because it falls on the safe side. But it would have been more beneficial to everyone and just as safe to
Yes - But only very rarely, have to make sure all is well carried out
Yes - Make them respray the aircraft
Yes - Questioned deicing lead/supervisor
Yes - I personally checked the aircraft and had the job done over again
Yes - Visual inspection
Yes - Spoke to deicers through open for deice
Yes - Did a visual and had the A/C re-deiced
Yes - Re-inspection
Yes - I inspected it myself
Yes - Had to ask for type of fluid used and questioned time of commencement
Yes - Back to the gate for more fluid
Yes - Confirm with company or lead as to spray status
Yes - Truck, poor pressure, did a wing and tail inspection from deice bucket, and reapplied until satisfied. Freezing rain
Yes - Re-inspected
Yes - I was concerned when our lead had a baseball hat with our competitor's union logo on it. Who's side is he on?
No - Been told at gate that I had deicing clearance when I knew there was frost on upper wing surface. This resulted in my insisting the A/C be deiced though the deicing coord. felt it was unnecessary
Yes - Verbal questioning via radio
No - Good service provided by trained crews
Yes - Has to file a report on YYC, had com. problems with ground crew
Yes - None
Yes - Had the aircraft sprayed again after physically checking the wings
Yes - Call crew back to complete job
Yes - Sprayed when no spray req'd due to guidelines
Yes - Submitted flight crew report to company
Yes - Requested further deicing
Yes - Called deicing crew chief to re-inspect exterior and redo area in question
Yes - Returned to speak to deicing crew and drew their attention to the problem
Yes - Personally inspected A/C
Yes - Had them redo the job (American station under contract)
Yes - Re-applied
Invalid response - Not exposed to this
Yes - Resprayed fuselage
Yes - Occasional variance from SOP by ground crew requiring verbal query/confirmation of fluid type & time to commence HOT
Yes - A couple of times, in YOW the service was so slow that the HOT was becoming a concern
Yes - In the US the ground drew had to be instructed how to properly remove the clear layer of freezing rain that covered the entire aircraft
Yes - /specified portions to be deiced that were not planned to be sprayed
Yes - Sometimes spraying is sporadic and sections of wing missed. Poor performance by spray crews at certain airports
Yes - Delayed departure till conditions changed
Yes - Visual inspection from inside aircraft
Yes - Ground crew are reluctant to deice fuselage as fluid leaks into cabin & cockpit via door-window seals
Yes - Had to inform deice crew of restrictions for deicing specific areas of aircraft i.e. doors, windows & inlets
Yes - Told them to repeat deice procedure
Yes - Aircraft was deiced again and a visual inspection carried out
Yes - Talked with mgt. Delayed flights
Yes - Horizontal stab is presumed clean of frost if wings are... I don't agree with the difference in height, that this is always the case & I ask ground crew to check stab/tail plane with bucket (28' high)
Yes - I supervised a subsequent deicing (in spite of ground crew abuse & reluctance). Propellers are an area of weakness with ground crew
Yes - Insist aircraft be sprayed
Yes - Only at small airports. Deice again or cancel flight
Yes - Either I have checked it myself or asked to be deiced
Yes - Respray with correct fluid
Yes - Spoke to ground crew and re-sprayed
Yes - Had to wait for second truck (15 min delay)
Yes - Returned for further deicing of one wing which had a large amount of slush still on it. This was spotted by a flight attendant
Yes - Using backpack type deicing unit - Had a second on hand and re-sprayed. (lucky)
Yes - Requested that our fuselage be sprayed rear mounted engines
Yes - None
Yes - They only deiced one side of the prop, and almost shook the engine off the aircraft. Had to deice again
Yes - Respray
Yes - Re-spray
Yes - Recommended that deice pads move to end of runways and be run by contractors one system for all users. Rather than clean at one place then join line and re-deice
Yes - Old faithfuls are sub-standard & I wrote it up
Yes - Discussed with ops, visually inspected
Yes - We got to the threshold of runway and decided to go back to re-deice
Yes - Capability - YVR winter storm waited until systems could catch-up
Yes - Type 1 fluid being sprayed on the critical surfaces with a Type 2 fluid nozzle. Visually confirmed surfaces were clean
Yes - Requested further deice
Yes - Verbal complaint that resulted in another truck being dispatched to hurry the process

Yes - Re-deice. Have had to use 2 deice trucks simultaneously to speed up process
Yes - In USA asked for 2nd spray still not satisfactory. Then cancel flight. Heavy wet snow sticking to all part of A/C
Yes - Returned to ramp for respray & wait for runway change. Only Type 1 available & long taxi to active runway + being a widebody with only one spray truck exceeded holdover time
Yes - Wait in line like everybody else
Yes - Pre take-off inspection
Yes - Vancouver was a total mess-up. Trip reports to company
Yes - Small airports
Yes - Visual inspection - deiced over
Yes - Type 4 anti-icing fluids are not always available otherwise the spray crews do a great job
Yes - Asked for re-application
Yes - Did an inspection & called for deice truck to return even though he had just given us thumbs up
Yes - Call lead to confirm fluid type or if specific surfaces completed
Yes - Did a last chance inspection of the wings before T/O to ensure they were truly clean
Yes - Deice truck incapable of completing process in sufficient time to reach T/O point before HOT expires, therefore T/O was delayed until weather improved
Yes - This was a language problem in YMX(?) Required prolonged discussion
Yes - Asked that it be redone
Yes - Got out & inspected the A/C myself
Yes - Visual inspection
Yes - I checked myself & asked for a re-spray
Yes - Sometimes I think it is overkill but usually it makes it safer
Yes - Advised ground crew that only leading edges was not sufficient & tail must be done also
Yes - Require A/C to be deiced again
Yes - Safety meeting discussion
Yes - Had it redone. Too slow to complete spraying in snowing conditions
Yes - Briefed the deicing crew
Yes - Refused to leave the gate until process was properly completed
Yes - Props not sprayed, props re-sprayed, wing re-sprayed
Yes - None possible due to Co. policy. Overridden by ground staff- using Type 2 or 4 when no precip - again a terrible waste of expensive fuel
No - No way of knowing one way or another if the job was done right. But if there is an incident, it's the pilot's fault right?
Yes - Asked to do certain areas over again because ice was not removed fully
Yes - Advised company, some areas were improved
Yes - Had A/C re-sprayed
Yes - See comments on question A1
Yes - Made them do over-spraying
Yes - Once, just asked deicer to go over portion of wing again
Yes - Again all they did was spray the A/C until it was all red
Yes - In YYC-see above
Yes - YYC, wings were still contaminated after an inspection when ground crew cleaned the A/C clear or contamination
Yes - Not in Canada, however in China I observed less experience & safety precautions. I had surfaces redone that were not sprayed satisfactorily
Yes - Visual inspection from cabin plus reinspection by deicers
Yes - Explain to crew "Communications inadequate, follow up with chief pilot"
Yes - Just to confirm nose area, as well as wings were sprayed
Yes - One crew forgot to deice tail & we noticed they went from right to left wing too quickly. This alerted us that the tail may not have been done so we exited A/C questioned crew & had the tail deiced
Yes - Request additional spraying
No - The capability & quality is excellent. The effectiveness is useless because of the long taxi times when A/P operations slow down during freezing precip
Yes - None
Yes - At some USA terminals where non company personnel are spraying our A/C a visual inspection is a must
Yes - But not in Canada - reinspection
No - I have to ask why Canada does not have the deice pad by the runway threshold. What about spending airport improvement fees on airport activities rather than shops
Yes - Complete walk around & requested a complete deicing again
Yes - Good deicing but not enough crews. Told management
Yes - Many occasions deicing was call upon for no reason by ground personnel
Yes - Yes, many times the ground crew did not specify what areas of the aircraft had been deiced. Ground crew should communicate to the pilots as to what areas have been deiced. (very important)
Yes - Questioned the lead as to exact times of beginning and end of spray
Yes - Called for respray with different type of fluid
Yes - Inside upon re deicing
Yes - Go outside and check, job for myself
Yes - Non standard procedures left doubt as to what was happening required confirmation of HOT start & fluid type. On one occasion, truck ran out of fluid & left without telling us
Yes - Discussed procedure with deicing personnel
Yes - They seemed to take less time than normal to deice leading us to radio them to ensure the tail had been deiced

Yes - Did a hands-on tactile inspection immediately prior to take-off
Yes - Request further treatment of the non-lifting surfaces
Yes - Re-spray correctly
Invalid response - Snow removal by sweeping hot through. Type I used when Type IV required for condition
Yes - Contract deicing in YYC - poorly trained crew. Checked and wrote it up (early in season)
Yes - Type I was used in YYC then it had to be redone followed by Type III
No - No, other than huge delays due to poor & unprepared planning
Yes - Had ground personnel check the wing with bare hands
Yes - See above. Requested repeat procedure & briefed crew on proper procedure
Yes - Checked wings even though not required by procedures in place
No - Excellent standard
Yes - Was advised by radio "no spray RQD". During pushback Lead asked why we were not being sprayed. Discovered that we had not been inspected prior to "no spray RQD" MSG. Had A/C sprayed. Corrective action re
Yes - Talked to the chief pilot on type and of course to the deice crew at the time
Yes - There is really not much you can do as captain. Can be overruled by lead ramp attendant
Yes - Due to environmental concerns, some airports only want deicing performed "on the pad". They are reluctant to spray props at the gate so you can taxi to the deice pad. shutting engines down on the pad -
Yes - Discussion with ground crew
Yes - Tactile inspection was performed
Yes - Trip report but they are usually a waste of time
Yes - Quantity of fluid flown and deice equipment size is often very questionable for snowfall rates. Holdover times are often exceeded prior to finishing the deicing process. Minimum deice equipment size
Yes - None
Yes - Procedures - confusion over who decides A/C is to be sprayed!
Yes - Had the A/C sprayed twice. Also once was told A/C had been sprayed properly only to lose all ATT.. REF. on rotation because the fuselage had not been cleared of ice. This occurred in the dark and we were
Yes - Instructed crew to deice areas of aircraft missed
Yes - Contacted the spray truck for further deicing
Yes - Confirm type of fluid re-deice inboard section of wing
Yes - Inspected wing prior to T/O and asked ground crew to visually inspect again
Yes - Deicing fluid was wrong type for conditions & none other available - had to be deiced (again) at runway holding point as only way to successfully deice & take off prior to HOT expiry
Yes - Question spray crew and reg. further spray
Yes - Too slow re-holdover times
Yes - Informed deice center that their pre-flight ice clearance did not pick up a small quantity of wing ice
Yes - Confirmation of respray due increase in precipitation during deicing
Yes - Talked to ramp personnel to advise how the job needed to be done better
Yes - I went back after questioning ground crew to complete spray due. Not spraying the tail (vert. stab.) they thought they only had to spray hort. stab. (All control surfaces ie. learning curve!)
Yes - Shut down aircraft & personally inspected aircraft
Yes - Lack of correct holdover times
Yes - Had them do it over (only at smaller stations with contracted services)
Yes - Re-sprayed
Yes - Return for respray
Yes - Booked off
Yes - Been resprayed and relayed report back to operations
Yes - In the USA deicing procedures seem to be more lax extra vigilance is required
Yes - One prop did not get deiced properly we realized by the vibration on engine start. We had to shut down and have it done then inspect
Yes - None - did a pre-take-off inspection
Yes - As mentioned sometimes time for deice = holdover time. An extra careful last minute (pre-take-off) inspection.
No - 1.Request for further deicing 2.Visual inspection

C4. How well have you found the representative surfaces to represent the surface conditions of the wing? (answer only if you have been able to assess condition on most of the wing)



[Note: 10% of respondents gave no response]

Comments:

Well - Very representative
Invalid response - Have never done it personally. Ask the F/O...
Poorly - I feel need to examine whole airplane. There is need to watch wind direct. & blowing precip. which can be the opposite. side of repr. surface
Well - Very representative
Not well - Does not readily indicate overall condition of wing. Readily discernible color fluid as Type 4 - green is the best method
Very well - Only variable along our wing would be fuel temp depending on fuel quantity, knowing what this is, an assessment of wing is possible
Poorly - Wing root is not the wing
Not well - Often ice was on the wing in the form of frozen slush under on the wing
Not well - On several occasions I have seen ice near the wing tips and the representative surface was clean
Poorly - They don't represent the outboard section which is critical for control
Well - The main problem here is visibility of the wing at night through a passenger window which may have fogged, is wet from precip, or has
Not well - From inside A/C risky call - have to touch if FZRA
Well - However the concept is flawed, the entire wing should looked at. Also both left & right sides
Poorly - 2 close inboard - fuel tank areas are outboard
Poorly - Always hard to see, especially at night
Well - OK but not foolproof
Well - Night time harder to tell
Not well - Really hard to see in the dark
Not well - Doesn't allow for effect fuel temperatures in different parts of the wing. Difficult to see at night.
Invalid response - Doesn't seem to work very well (as a concept)
Not able to assess most of wing - With limited wing access the parts observed were similar to the representative surface
Not able to assess most of wing - We should inspect entire wing, tail and top of fuselage
Not well - At night thru opaque window covered with fluid, very difficult to assess condition
Very well - It is one area that has been scientifically selected for a final (quick) inspection
Poorly - Different colour + texture than rest of wing on this aircraft. (Rep. surface is textured friction pad for PAX. Emer. Over wing evacuation
Not able to assess most of wing - When in doubt we open the door & go outside & touch the wing
Poorly - Assuming you are referring to viewing wing from a cabin window, difficult due to moisture on window, req's viewing from open exit door
Well - Located a wing root, wing tip not always in same condition
Not well - Icing does not cover 100% of wing all the time therefore you can have ice somewhere on wing and not on rep. surface
Well - Although difficult to see very well from cockpit in flight especially at night
Well - Night time is difficult from inside aircraft
Poorly - Too many factors involved
Well - Consideration to icing formed on approach not being visible on representative surface should be given i.e. at the very front of the leading edge
Not able to assess most of wing - We have no examples of pictures of fluid failure on representative surface
Well - Except difficult to determine at night due to inadequate lighting
Not well - Rep. surface clear - Outer wing snow covered
Well - Will not tell you condition of wing root area
Not well - Representative surface is not telling you the story
Invalid response - I check the whole wing (both) and tail surfaces regardless of what is the rep. surface area
Poorly - Wind can greatly affect snow buildup on wings. One can have much more of it than the other
Very well - Only trust yourself Pal!
Not well - I look at the whole wing
Not well - Too hard to see out cabin windows with fluid running over them
Well - Sometimes hard to see
Not able to assess most of wing - Waste of time - L.E. is most important
Well - Poor lighting at night or yellowish orange halon lights make it hard to tell even on rep. surfaces
Well - The rep. surface's too small & specific an area

Not able to assess most of wing - Often unable to assess total wing area due to blowing snow or because deicing fluid smearing the windows
Not well - Icing is not equal anywhere
Not well - Current A/C type has a blind spot @ wing root which is very susceptible to icing
Poorly - Very difficult to inspect a wing from a cabin window
Well - I assume that the rep. surface which I can see reflects what's on the rest of the wing
Invalid response - I assess entire wing, not just rep. surface
Not well - Always look at all wing/tail surfaces in a deice/no deice decision
Not well - Ice will often remain hidden in the wing root area
Invalid response - One cannot tell
Not well - Position of fuel in wing
Not well - Due variations along wing- uneven contamination
Not well - Frost and some ice accumulation differ over fuel tanks
Invalid response - Not exposed to this
Not well - Clear ice is still hard to see
Well - Easily visible from cabin
Poorly - I found rep. areas not consistent with entire wing
Not well - Too small an area
Poorly - This is one of the dumbest ideas around. Wing frost occurs in areas of fuel tanks where fuel vapour pressure is high. i.e. outboard
Well - Depending which side is lee of blowing snow
Not able to assess most of wing - Visual inspection (vs tactile) is unreliable
Poorly - Inboard section of wing (Metro3 123)over aircycle machine not visible heavy causes ice to form/snow stick while rep. surfaces will be clean
Not well - I feel an external touch of the wing is a more accurate method under certain conditions
Very well - Black painted/red painted spoilers would well
Well - Black paint on rep. surface comes off soon after being painted, exposing white underpaint, crews unsure if seeing paint or ice in flt
Well - I always look at the entire wing
Well - Depends on wind, A/C around you etc.
Not well - Hard to tell wing surface from ice depending on lighting
Not well - Especially at night
Poorly - Wing spoilers frost covered & area over cold fuel (outer tanks) frost covered but rep. surface dry and clean
Invalid response - Depending on conditions
Very well - I visually check wing each time
Poorly - The A/C windows distort vision at best of times. With de/anti-ice fluid on them + adverse weather it's extremely difficult to see
Not able to assess most of wing - High wing can't see
Not well - Colour of wing makes it hard to determine
Well - Low wing A/C is easy but high wing no way
Not able to assess most of wing - Wing too high, Low wing does not provide opportunity to check against rep. surface. Done by ground agent
Not well - You cannot check surfaces by looking at them. You must touch the surface
Not well - Not very good in X-wind condition
Well - Except for centre station of fuel cell with cold soaked fuel (Approx. 10sq.feet)
Invalid response - N/A
Not well - Because of wind I have seen quite a difference between left & right wing
Not well - Out near wing tip - snow accumulated along wing root
Not well - Especially at night
Well - Spoiler extension for top view-leading edge lights for front view
Poorly - Difficult to see/distinguish ice i.e. night time, lighting
Well - Black stripe on silver wing shows a good contrast and gives a good indication of entire wing's condition
Well - Upwind wing in strong winds differs considerably in protection & ease of view for assessments
Invalid response - Rarely bad time/opportunity to look
Not well - Difficult to detect clear ice
Not well - Poor view through windows, subtle differences in appearance of early failure
Not well - Spoilers must be extended for visual, not enough wing area to make proper assessment
Not well - With winds often more precip will fall outboard of the rep. surfaces
Not well - At night or poor lighting conditions very difficult to detect wing conditions
Poorly - There is too much variation in contamination on different areas of the wing
Well - Change to poorly after dark
Not able to assess most of wing - Wings about 15' above ground. Please explain how I can access this either on the ramp or prior to T/O
Poorly - Rep. surfaces are clean, frost on other wing surfaces
Not well - Depending on wind direction
Poorly - Fluid failure can be very hard to detect with Type 4 Ultra when viewing black stripes
Not well - Rep. surface is only 1 wing - what about the other wing
Well - For my type of A/C
Not well - Under poor light, ie. night, a closer examination of all surfaces is necessary. Also fuel load varies contaminated area
Not well - The rep. surfaces only work under ideal viewing conditions which rarely exist
Well - Composite materials do not represent wing cond. well
Not well - Wind affects how much, and which wing is covered
Not well - Leading edge fails first
Well - Generally indicative of rest of wing
Well - Leading edge & spoilers visible from cockpit
Not able to assess most of wing - High wing A/C are much worse than low wing for obvious reasons
Invalid response - Unable to answer
Not able to assess most of wing - With certain X-winds prior to T/O you can get snow not building on the

representative surface area. But covering the rest of the wing
Well - Good during day - hard to see at night with fluid dripping down windows
Not well - Due to wind and A/C position snow/ice accumulation will vary along the wing
Well - Done by actually looking at wings through window
Not well - At night in poor conditions who is kidding who
Not well - High wings are difficult to view
Well - However, the A-320 has a tendency to frost over the spoiler pads only!
Not able to assess most of wing - Never used
Not well - Blowing snow on the opposite side may not show; and often cabin windows will not permit you to see clearly
Not able to assess most of wing - The representative surface on the wing of my A/C is a very reliable indicator of the conditions of the rest of the wing
Not able to assess most of wing - Difficult to tell unless able to actually get up and test the wing personally
Very well - However, it is hard to see out passenger window with glycol on it
Well - Poorly during darkness
Invalid response - Variable
Not able to assess most of wing - Unable due darkness, poor visibility
Not well - Not well when checking for frost on wing. Cannot comment after deicing
Not well - Difficult to see outboard ailerons & no easy access to view tail especially & night & stormy weather
Well - Present policy too restrictive
Not well - Poorly lit for night ops
Well - Poor however under conditions of high humidity, low temp, and full fuel tanks, whereby the cold fuel causes clear ice to form on wing
Well - Still very difficult to see at night
Not well - Sometimes the makers are clear but LE or TE has frost etc.
Very well - Spoilers
Not able to assess most of wing - B747-400
Invalid response - I have not noticed any disagreement
Not well - Rely on deice men
Well - Sometimes when frost or ice resulted from fuel level & temp (or warm fuel protected an area from frost) rep. surface not helpful
Well - Although sometimes fuel tank icing needs to assessed by a work back to wing area
Well - During daylight OPS
Well - Only due to representative surface being painted a different colour
Not well - There should be representative surfaces on both wings due to wind, lightning & other factors
Not well - One spoiler panel can tell you some but not all
Poorly - The engine pylon area may be subject to engine heat/airflow not present on wing
Well - Frost on outer 1/3 of wing not represented on strips
Not well - Local phenomena affects the wide area of the wing differently e.g.. wing - sunlight (the part of the wing in the shadow is colder etc.)
Not able to assess most of wing - Painting the wing 'white' has greatly deduced the ability to detect contamination
Not well - It's suppose to be painted black but it has so many white chips in the paint you can't tell if there's ice
Not well - DHC-8 uses roll spoilers, and when getting deiced often pilot side windows get distorted with deice fluid
Not well - Can't inspect wing properly when squeezing by two passengers
Not able to assess most of wing - High wing A/C
Not able to assess most of wing - Representative surface difficult to see at night and is not located near wing fuel tanks where the deicing fluid tends to fail first
Not able to assess most of wing - Hard to see from cabin; impossible from cockpit, and aircraft too large to see from outside without cherry picker
Well - Cannot be seen properly from inside A/C at night
Not able to assess most of wing - I doubt that a 747-400 pilot ever goes down to the main cabin to peer out at the wing
Invalid response - Can't see through cabin window well enough most of time
Well - With adequate lighting and our standards - R.S. is adequate method
Not well - Nighttime & windows opaque from spray or precipitation
Not well - Difficult to see representative surface on top of wing close to fuselage
Not well - Use of overall view of each wing is critical
Very well - Entire wing is visible from cockpit
Poorly - On my A/C the rep. surface is wing root area, which of course will not show clear ice due cold fuel & also spoiler panels seen to frost
Not able to assess most of wing - See A3
Poorly - Unable to see clearly due fluid on windows & colour "white" of night time near impossible surface
Not well - Cannot see ice that forms on top of wings (fuel tank icing)
Invalid response - This is unacceptable on high wing, T-tail equipment
Very well - However the only legitimate assessment is a "close up" inspection which is impossible
Very well - If there is any ice on the wing it is likely to be in the representative surface
Not well - External visual inspection is best
Invalid response - Don't understand the question
Not able to assess most of wing - "Texture" of surface
Not well - Good idea, but ice patches above fuel tanks (cold soaked) are not along the rep. surfaces
Well - Generally well but sometimes difficult to see, especially at night

C5. (a) How do you recognize failure of de/anti-icing fluid during snowfall?:

Responses given below	564	79%
No answer:	90	13%
Answered "?":	20	3%
Answered "Don't know" or similar:	37	5%
Total surveys completed	711	100%

Comments:

Loss of gloss or rough surface or water bubbles
Loss of "slick/glossy" appearance
Loss of gloss water "bubbles" next to skin
By contamination adhering
Doesn't melt
Excessive snow sticking to wing
Snow on wing
Building of contamination
Snow sticking
By report from F/O and the guide lines
Buildup? Never been sure though.
Open your window, feel it - visually begins dulling + irregular rather than slick smooth
Loss of gloss or rough surface or water bubbles
Hazing or accumulation of snow
Bumpy texture over wing from snow melting
Snow visibly sticking to wings
Snow accumulates dulling surface reflectively. Loss of gloss.
Snow saturated, turning white
By absorption of precip. i.e. no snow on top of fluid
Snow not being absorbed by fluids
If snow stays as snow on the wing
HOT
Rep. surface becomes opaque no longer clear
Snow accumulation
Don't understand exactly your question
Contamination of fluid
By physically touching the wing
Increase of snow accumulation on surface
Turns opaque - accumulating
Snow build up on wing
Accumulation of snow in patches
Snowflakes absorbed by fluid and no accumulation
Snow stats to show /in fluid/fluid crystallization
Snow seems to stay in original appearance
Accumulation of snow, slush on wing a colour change
Trust timing
Snow starts to stick or forms little pieces of ping pong balls over the wings
Not shiny
Snow remaining on wing and not mixing with fluid
Fluid turns opaque
Snow should melt
Sticking
Start to see slush look to leading edge
Not shiny
Snow starts to stick & buildup
Slush on wing
Accumulation of colour slush + snow
Glossiness, patches or snow on top
Sticking snow
1. Progressive freezing of surface 2. snow accumulation on top of fluid 3. random snow accumulation 4. dulling of surface reflectivity (loss of gloss)
Time, rate of fall, visual inspection
Snow begins to accumulate on protected surfaces
Snow build-up
Slushiness close visual
Representative surface snow will stick
Snow stops on wing
If snow begins to accumulate on top of wing
Accumulation
Snow/slush on wing
Glossy shine disappearing/fluid
Usually noticing snow adhering
Snow stops melting (buildup)
Loss of shine buildup. Wing inspection from cabin and if necessary tactile and with ground support
Visible snow on wing
Snowflakes are not absorbed
No longer looks glossy
Snow accumulates
Accumulation of slush/snow
Glazed surface has bubbles on it
Snow accumulation on top of fluid
Loss of glossy appearance, accumulation on top
Loss of gloss, snow accumulation
Snow remains on wing (does not melt)
Reforms as a slushy substance
Snow begins to accumulate on wing
Saturation of fluid
Accumulation of snow
Opaque & colour
Snow or rep. surface
Build up of snow
Difficult to assess, foam patches look like snow
Slushy appearance
Through visual inspection out windows prior T/O
Slush or lack of melt on wings
Slushing on wing
Slush forming on REP surface
Snow building up not being melted
Have no training
Adhering ice or snow
Flat appearance of fluid (not glossy)
HOT and visual inspection
Snow accumulation
Accumulation and sticking
Buildup of snow on wing
Opaque colour and layer on wing
Please see C1
Strictly accumulation/time
Moist film on top of wing
See written test for answer
Wing not shiny, accumulation
Snow not melting on fluid
Obvious
Holdover times
Snow accumulates

More training is necessary. See C1
Visual inspection
When snow or ice is adhering to the surface
Accumulation
Didn't know it failed
Coverage +loss of sheen
Visual
Formation of granular accumulation/dull finish
Solid particles adhering to wing
Snowflakes not melting
Milky appearance
Accumulation noted (not shiny)
Never had failure
Snowflakes accumulating
Fluid turns opaque
Check rep. surface
Colour
Accumulation of precip.
Accumulation
If it is accumulating on the wing
If wing/fluid does not glissen
Failure of de-anti-icing fluid is a new term to me!
Slush-like look to fluid
See C2
Snow sticking to wing
Snow covering rep. surface
Snow will not melt upon contact with wing
Snow covers part or all wing surface
Surface wetting not uniform - visible contamination
Visible snow on wing (not melting)
Thickening of fluid - opaque colour
Not briefed
Buildup of snow
Snow not melting on wing and accumulating
Snow not melting
Accumulation of snow grain on rep. surface
If exceeding holdover time go back and visual
Snow not melting
Snow visible and adhering to surface
Snow won't slide off spoiler
Time expiration and visually
Snow does not assimilate with fluid
Snow adhering
Snow accumulation on wing surface
Not absorbed sticks to surface
Use HOT tables as limitations
Snow texture apparent on wing
Accumulation
Expiration of HOT and visible ice accretion
Buildup of snow
Loss of gloss, snow or ice accumulation
Precip does not bead off wing
Snow no longer absorbed by fluid
Opaque
Slushy type of appearance, accumulation
Failure of snow to melt completely
Buildup of "clean" snow/HOT
Snowflakes show through fluid
Thickening of wet snow on surface
Snow adhering to the surface
Snow accumulation on wing
Snow adhering & lost of glossy look
Loss its shiny appearance, snow sticking
Accumulation of snow
When snow or ice is adhering to surface
Snow accumulation on wing (patchy)
HOT & snow sticking or slush
There are 2 separate things. Snow begins to accumulate as wet crystals
Snow re-appearing on surface
Accumulation on top of deicing fluid
Snow not melting
Holdover - visual
Surface will contaminate
Snow sticking and visible on upper surface
Visual adherence to surface
Visible accumulation of snow adhering to wing
Snow sticking to wing
Snow on wing seen by "rough" surface.
Snow will buildup on wing
Loss of full liquid state
Rough/white accumulation
Not dissolving on impact
Failing to melt on rep surface
By the accumulation and whiteness of the fluid
Loss of shine on fluid surface, snow flakes not dissolving into fluids
Snow on top of fluid, loss of gloss, freezing of surface
Visible accumulation of snowfall on visible surfaces
Visual inspection through cabin
Accumulation
Wing surface looses sheen
Crusting or spotting (Blotchy snow)
Snow accumulation on wing
Buildup on rep. surface
Dull reflection
Build up of snow on wing
During snowfall: With white crusty buildup, very easy to see
Snow accumulation
Snow accumulation
Snow accumulating on the upper surface of wing
Slush
Snowflakes still present on the wing
How mush stick to the wing
Grainy appearance of fluid
Loss of sheen - snow accumulation
No experience using anti-ice fluids ?
Snow not visible on surface
Questions or statements?
Accumulation
Snow begins to accumulate on the surface
Accumulation of snow on wing
Snow adhering to wing sec
Snow grains don't melt
Rep. surface not seen clearly
Looses gloss-slushy or buildup of snow
Snow accumulation

Charts HOT
Accumulation on rep. wing surface
Accumulation on wing
Look for accumulation of solid precip.
White snow on wing
Snow starts to buildup on top
Colour change of fluid-becomes whiter
Buildup of contaminant
Snowfall accumulation
Accumulation of snow
Type 4 snow going through fluids - Type 1 obvious dilution accumulation of snow
Accumulation of snow
Wing looses its glassy look
Yes
Sloppy buildup
Snow is absorbed by fluid
Accumulation on wing
Snow gets slushy and wing looses shine
Accumulation
By looking at wing surface from cabin window
Surface looses shine
Buildup on wing/mottled look
Snow flakes not melting shortly after impact
Snow accumulation on wing
Loss of shine/slush
Buildup of slush or snow
When surface no longer looks wet
Snow on top of fluid
Snow remain frozen and is not absorbed by anti-icing solution
Visually and/or time expired
Wing looses smooth glossy surface
Fluid looses its shine (gloss)
Snow does not melt
Snow accumulation, dulling
If snow is sticking to the spoilers when raised
Snow accumulates and sticks to surface
Snow not melting on wing
Snow stay on wing
Snow buildup on wing
Snow no long melting and adheres to wing
Snow sticking to wing
Snow adhering to wing
HOT exceeded - Snow, ice on wing, loss of gloss
Remains visible
Snow buildup on wings
Shiny appearance disappears & snow accumulating on surface
Holdover time
Wing surface does not look smooth any more
Check wing
Buildup
Visible precip on wing
Buildup of snow on coloured spoilers in up position
Accumulation & duration
Fluid turning cloudy
Not melting
No formal training was ever require, therefore do not know
Snow not melting on contact
Wing accumulation
Buildup of snow
Snow buildup
Wing colour is white
Charts + visual inspection
Granular appearance - glossiness disappears
Snow melts & is kept fluidy
Wing surface looses glossy appearance
Loss of colour viewed on the spoilers
Snow not melting on impact
Accumulation
Adhering Accumulation
Accumulation of snow
Snow accumulating on top of surface
HOT - or accumulation
Appears slushy
Snow not melting, sticking
Snow stays on wing - does not discolour
Visually sticking
A noticeable accumulation on the wing or nose of A/C
Accumulation
Snow accumulates on top of wing
Fluid can no longer absorb and snow make appearance on top
Visually
Slush buildup
Snow accumulates on black boots or "coloured" roll spoiler
Loss of consistent colour and fluid texture.
Snow accumulation on top of fluid
Accumulation of snow on surface
Loss of gloss, accumulation of snow on top of fluid
Accumulation
Snow accumulations
Snow stays on wing & starts to buildup
Not glossy anymore
If surface looks opaque
Patches of snow forming
Accumulation
Snow accumulation +or mat appearance of surface
Not enough experience
Visual inspection- snow accumulation no melting
Opaque or accumulation
Snow starts to buildup
Snow accumulation over the fluid
What type
Visible snow or buildup
Snow remains
When liquid becomes fuzzy with little patches of snow at some places
Accumulation of snow on wing stripes
Adheres to A/C opaque appearance
Snow visible on surface
Accumulation
Is the stuck sticking?
Opaque film over surface
Timing only
When snow starts to accumulate
Any accumulation on wing
Accumulation on spoilers, leading edge
Accumulation of snow on top leading edge

Just go by HOT table and assume if below HOT, fluid is satisfactory
Check condition of wing prior to spray by touch inspection and use conditions and experience HOT
Flakes remain intact on surface i.e. do not melt
Snow that doesn't melt when touching wing surface and begins to accumulate
Snowflakes remain on wing they are not melted
Fluid becomes opaque not clear
Snow no longer disappearing into fluid
Fluid on wing becomes patchy rather than uniform
When I can't see the rivets through the slush
Areas of snow accumulating on the wing
If fluid starts to "gel"
Accumulation of snow
Snow not melting
Slushy buildup
Near HOT touch test
Appears to be allowing snow to settle
Flakes are sticking not melting
Snow accumulation/dulling of surface
Snow building on top fluid
Accumulation & not melting
Patches of snow accumulation on wing
Don't know what fluid failure is!
Accumulation of snow/loss of gloss
Clumping up
Snow buildup
Snowflakes remain visible on surface (not melting)
An accumulation of snow or snow sticking
Buildup of snow on surface
When snow adhering to wing
Clean shiny - opaque
Snow buildup/bumps in fluid
Snow starts to accumulate
Snow adhering to wing
Contaminates remain adhering
Accumulation of snow (depth) mixed on wings
Snow will adhere without melting
Visible snow on wing surface
Accumulation of snow
Accumulation of slush
The surface becomes opaque
Failure to flow freely off extended spoilers
Slush on surface
Buildup of precip on the wing
Accumulation of snow
Visible accumulation
Surface becomes rough/white
Snow buildup
Accumulation on upper surface of wing
Visible snow on wing surface (or is it the surface of semi-gel)
Accumulation of snow on surface
Snow sticking
Accumulation
Snow remains on leading edge
Rapid accumulation
Holdover times or ground workers
Unmelted snowflakes/slush accumulation
Snow accumulating on top of fluid
Can see 1/2 of leading edge, can see wing spoilers
During holdover times as a guideline I look for dilution of fluid colour & some buildup or slight accumulation
Buildup
Can see if prop wash keeps wing clear
Snow on wings
Snow does not melt and builds up on surface of A/C
Precip adhering to wings
Snow will begin to liquefy
Loss of surface exposure or gloss
Snow does not melt and disappear (fluid not clear)
Loss of gloss-snow accumulation
Loss of gloss (supposedly)
Loss of fluid gloss/some snow sitting on fluid
Snow starting to accumulate
Leading edge/spoiler visual runoff & colour
Buildup not melting
Accumulation of slush
Snow, ZL or IP accumulation
The snow begins to accumulate & not roll off wing
Snow accumulation
Accumulation of snow on wing/rep. surface
Build up or color/tone, textures change on wing surfaces
Visually check for accumulation
Snow accumulation on top of fluid - possibly random
Accumulation of snow on wing
Graining surface - snow not melting on contact
Snow on fluid
Using time, temp & Conditions
Loss of gloss in fluid - snow building up to "slush"
Use of ground SPLN deflection
Loss of sheen
Snow does not melt or mix with the fluid
Snow build up
Visible snow sticking to deiced areas or representative surfaces
Snow blows off instead of sticking
Snow fails to slide off with fluid
Either snow on leading edge, nose etc. or white represent surface
Fluid run-off therefore dilution/sticking
Colour difference
Colour change, slushy appearance
Accumulation of slush
Slushy look
Visually
Loss of surface gloss
Snow does not melt & is adhering to surface slush
Fluid loses gloss
Lack of absorption & melting, gloss, snow accumulation, etc.
Change in visible texture of fluid and colour
Accumulation opacity
Snow on wing
If snow flake is still visible upon contact
Opaque appearance, crystallizing
Milky colour

Increasing concentration of contaminants on the surface
Snow adheres and accumulation
Accumulation - colour of fluid
Snow adhering
Accumulation of snow
Slush or chunks visible. Fluid turns ***
Visual - slush accumulation
Accumulation in wing
Fluid looks like slush
Accumulation of ice or snow on surface
Accumulation
Snow build-up
If Ultra solution has been applied
Build-up of snow
Surface white, no longer shiny liquid
Snowfall does not melt
Loss of colour, adhesion to roll spoiler deployment
Any snow accumulation on top. Very difficult at night
Snow accumulation - rep. surface colour change
Loss of gloss & snow accumulation on wing areas
By visually checking for build-up
Appearance - white and textured
When snow stops melting with contact with surface
Unable to see wing
I look for an accumulation of ice or snow that is sticking to the wing
Get out and feel the wing
Accumulation of snow or slushing of snow
Slush/granularization of remaining precipitation
Appearance of trails of snow in fluid
Holdover times in conjunction with appearance
Check for snow (white colour) on a dark painted spoiler that is extended
Snow sticking to wing
Snow accumulation on wing (rep. surface)
Snow starting to adhere/build-up
Time & visual inspection
Accumulation of snow
HOT & visual inspection
Snow not melting on wing
Accumulation of snow
Snow build-up
Build up on critical surfaces
Representative surface shows signs of "whiteness" (fluid contaminated)
Snow appears to sink into fluid
Snow not being melted, dull appearance of fluid
Can't see the colour of the fluid anymore
Representative surface: Spoiler on high wing, with red paint
Rely on HOT, considering precipitation rate, visually inspect
Accumulation on representative surfaces
Snow clumping and staying on the surface
Crystal pallets & rough fluid appearance
Snow accumulation on wing
Snow start to accumulate again
Accumulation of snow on top of fluid
Accumulation of snow
Wing inspection fails
Glossy appearance lost
Becomes opaque
HOT, spoilers & wing boots contamination
Snow absorbed quickly, disappears
Using representative surface and time
Snow visible in or on top of fluid
Texture of surface
Snow not melting
Accumulation of snow or ice contamination on critical surfaces
Visible adherence of snow to wing surface
Loss of 'shine' to deice fluid
Use of spoiler
Visual inspection
Raise spoilers (hard to see)
Change of appearance
Snow accumulation
Fuzziness/opaqueness over darker screwheads on top side of wing e.g.. screwheads not sharply visible
Visible snow
Build up
Accumulation
Check to see if snow remains granular after contact
Patches or snow randomly adhering to surface
Slush forming
Non smooth surface
Snow on top of fluid
Lumpy surface
Snow buildup on top of fluid
Unknown
Accumulation of wet snow
Snow accumulation
Slushy mixture on surface
Lack of visible fluid
Snow on wing after deicing
Time/rate of precipitation
When snow begins to accumulate
Look to see if snow is discolouring if fluid over all wing
Accumulation
Slush accumulation on wing
Sticking of snow on surfaces
Snow ie. white patches will start to show
Snow on wing
Visual inspection - snow build-up on wing
Gets slushy
Surface is slushy
Mostly holdover time and the inspection
Snow remains on representative surfaces
Holdover time exceeded
Snow starting to "stick" to wing surface & accumulate
Glazing/frosting
Snow solidifies, turns slushy & raises on wing surface
Build up of snow on surfaces despite fluid presence
Snow adhering to the wing
Deice boots becoming coated with snow
Build up
Have never seen fluid failure in any condition
Snow build-up
Accumulation
Snow sticks
Type I fluid visual presence
Accumulation of snow/icicles

Representative surface shows contaminant
Snow sticks
Combination of: table & visual observation
Snow sticking on wing
"Texture" of surface
Snowflakes failing to melt & dissipate
Presence of snow on fluid
Cloudiness/opaqueness in fluid

C5. (b) How do you recognize failure of de/anti-icing fluid in freezing drizzle/rain or ice pellets?

Responses given below	473	66%
No answer:	153	22%
Answered "?":	33	5%
Answered "Don't know" or similar:	52	7%
Total surveys completed	711	100%

Comments:

Very difficult must reduce HOT times as per conditions
Very difficult
Not smooth surface
Assume failure after HOT. Hard to see from inside aircraft
Slushy acc. on wing (loose of shine)
Thin layer of ice forming
Ditto (after receiving the written info about what to look for)
Feel it.
Very difficult, must reduce (HOT) times as per conditions
Wing no longer shiny, but it is difficult
Bumpy texture and/or glazed look vs clear
Uncertain - suspect a glossy appearance if freezing rain
Progressive freezing of surface, random accumulation, could be hard to detect from inside
No run-off, looses shine
More difficult but we look for a uniform fluid presence and no shiny area where there appears to be no fluid. F/R most difficult & when HOT expires a tactile inspection or respray
Representative surface opaque
If the consistency of fluid changes or if ice pellets remain intact on the wings
Difficult to assess
By physically touching the wing
Shiny rough look on surface
Rough surface - with great difficulty - need eye for it
Clear or rime ice on wing
Loss of glossy appearances in patches
Breakdown of uniform texture of surface of fluid. Faded gloss of fluid
Doesn't melt immediately
Hardly
Accumulation of slush
Trust timing
Clear icing extremely difficult to identify
Colour changes
Wing becoming clear or fluid colour fading
Same as above
Difficult to assess
Sticking
Use holdover time ** **ZL, ZR, - don't go,- ice pellets normally don't adhere
Starts to become opaque
Difficult looks like clear ice - that wet look
When time is up freezing rain on surface looks like deicing fluid so you go by timing
Glossiness, patches or change of wet look
When they start to stick & show on top of fluid
Progressive freezing of surface, dulling of surface reflectivity
Time, rate of fall, visual inspection
The wing is either clean or it isn't
Icicles begin to form or water appears to turn to ice on the protected surfaces
You have to touch the surface if suspect
Actual visual plus feel of top of wing
Representative surface hard to tell
Fluid is shinny
If the top of wing loses it's glossy appearance and begins to appear dull
It has never been a factor in our operation (quiet airports short taxi time)
Freezing of precipitation on contact
Any type of contaminant adhering to surface
Lumpy or loosing liquid
Precip starting to adhere
Visually + due to difficult to detect clear ice - touch
Loss of fluid colour or excessive shine, whenever HOT exceeded/ deice again under these conditions
I don't fly
Does not flow off wing
Accumulation of ice on non-heated aircraft surfaces
Same
Progressive freezing of surface and loss of gloss and smoothness
Surface consistency uneven, loss of gloss
Loss of gloss
Wing not glossy in spots-freezing rain impossible to tell from inside aircraft
Reforms as clearer icing
Visible
Loss of gloss
Who flies in freezing precip.
Loss of shiny consistency on top of wing
Freezing drizzle impossible to assess
Transparent appearance
Formation of non-running pebbles or slush build-up
Slushing on wing
Discoloration of REP surface
Bubbles or pellets visible
Do not depart in this condition
Colour fading in freezing drizzle or ice pellets visible
HOT, visual & tactile

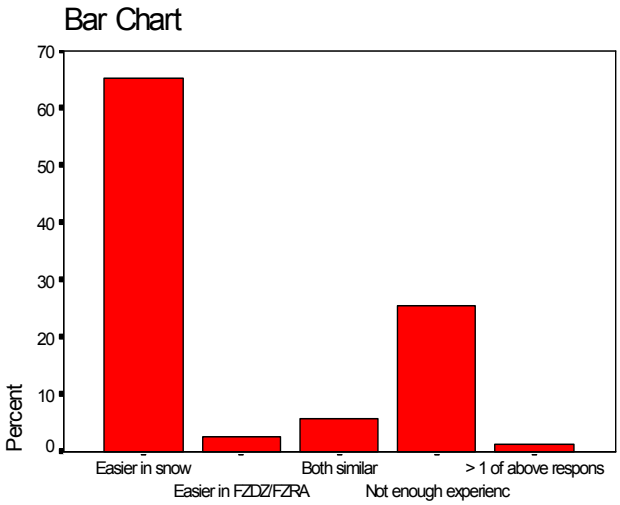
Fluid break there
I don't fly in ZR or IP
Opaque colour
Rarely depart
Same as above, in addition pockets of shiny or rock like marks on wing surface
Glossy reflective surface
More fluid
Holdover times
Visual inspection
Same as above + holdover times
Visual
Only tactile inspection
Same as above
Rough surface
Rough surface
Very hard to
Fluid turns opaque
Same
Colour/adhering
Opaque fluid
Very hard to see bumpy ice usually
If it is accumulating on the wing
As above for drizzle, ice pellets + opening flt deck window to see if snow, drizzle etc. is adhering to the A/C nose area
Fluid separates and ice forms
Not able in freezing precip. ice pellets see above
Accumulation of contaminant on treated surface
Hard to know since Type 4 is shiny/glossy have to rely on HOT or manual check (have over surface)
Surface wetting not uniform - visible contamination
Surface no longer wet or glistening
Opaque colour
Feel open door + touch
Colour from fluid disappears and/or ice forming
Dull sheen on wing
Loss of clarity on the rep. surface lines
"" "" ""
Not melting
Rain adhering to unheated cockpit or cabin windows/wiper blades
Spoiler collects ice (it doesn't slide off)
Same
Fluid washes away
Ice forming
Pebbling on wing
Ice buildup/ no absorption
Use HOT tables as limitations
Surface not smooth
Running of fluid
" " " " " " "
Buildup on surfaces of ice
Surface freezing buildup of ice in or on the fluid, presence of slush
Looks like crazed gloss when failure occurs
No longer absorbed by fluid
Less fluid colour, or lighter
A clear type of ice surface. More difficult to detect.
Fluid solidifies
HOT
When wing no longer looks pink
Surface becoming glossy
The colour of the de/anti-ice fluid is now clear
1. more difficult, possibly returning to ramp if HOT time expired for respray 2.Obvious buildup of ice covering critical surface
Loss its shiny appearance
Difficult
Loss of gloss on the surface
Hot visible pellets
Wing begins to get a complete shine to it
Shiny ice on surface or slush-like appearance to wing
Surface loses shine
" " " "
Ice pellets lying on wing
Visual appearance
Loss of sheen as well as some rough areas (on rep. surfaces)
Colour will be diluted
Accumulation on unsprayed surfaces(windscreens, wipers, etc.)
Sheen and visible texture dissolve
Same
By the brightness of the wing surface & apparent solidification of the fluid
Loss of shine on surface not smooth, ice pellets visible in fluid
Loss of gloss, freezing on surface
Visual inspection with attention paid to rep. surfaces (through cabin)
Accumulation over painted stripes
Apparent accumulation
Some buildup of uneven material
Wing loses its shiny sheer appearance
Dull reflection
Film remains on wing and bubbly
FZDZ/FZRA: Almost impossible. Ice pellets? Hello! They bounce off. If you don't deice, no problem. If you do deice they become a problem
Uneven distribution of fluid on wing surface/rough
With difficulty under some lighting conditions
Touch only
Same
When in doubt tactile
Same
I suppose it depends on light. May be impossible to determine in freezing precip
The luster or shine of the fluid surface becomes more opaque or dull
Forming of water on wing
Use holdover times
Grainy surface
Difficult-never exceed most conservative HOT, never depart in FZRA or Ice pellets
No longer smooth
Fluid beginning to freeze
HOT charts
Precip adhering to wing/rep. surface
Very difficult to assess
Same
Gloss or shininess to fluid

Buildup of contaminant
Very difficult from visual inspection must rely on holdover guidelines
Accumulation of ice pellets, or loss of fluid colour pink or blue
Accumulation of material on wing
Extra careful to see a smooth texture to fluid
Yes
Bumpy buildup
Fluid becomes opaque
Can't, if holdover time up I will respray
Wing gets very shiny especially in light at night
Accumulation
Surface becomes rough
Harder - Mottled/change
Pebbly appearance on wing surface
A buildup also the sheen of D.I. fluid is not uniform
Same
Glassy appearance of fluid
Glazed surface as ice layer forms on wing
With great difficulty
More difficult
Same as above
Accumulation on wing
Ice pellets fail to liquefy, freeze-up of surface, dulling
Ice forming on wing surface
Rain/ice splashes or bounces off wing
Pellets not melting
Ice crystal forming
Rough surface on wing
Fluid starts to turn opaque (whitish colour) on the rep. surface
Ice sticking to wing
No concrete way
Same
No change
Checking visually
Ice pellets accumulating on surface
Holdover time
Accumulation seems to be forming
Time, check wing
Pebbling effect
When the fluid looks opaque rather than reflective; wet
Visible ice accumulation
Bubbling
Time accumulation
Visible accumulation of ice
Loss of shine or buildup
Charts + visual inspection
Pellet is visible/non melted
Water beads or ice move along wing indicating it's not sticking
Hard to detect, dependent purely on holdover time and rate of accumulation
Rough surface and/or accumulation
Adhering accumulation
Very hard to tell except by touch
Disappearance of die from surface
HOT - or accumulation
Freezing apparent on rep. surfaces leading edge backwards. Sudsy appearance of deicing fluid changes
Pellets stick to each other
Difficult without touching
An accumulation on the nose
Touching the surface
Visually + feel
Slush buildup
As above including windshield
Same
Progressive freezing of surface
Presence of ice on visible surfaces
Loss of gloss
Water bumps
Difficult to see from flt deck but can be noticed by discolouration of fluid. Check form overwing window on black paint strip if not sure from flt deck
Not glossy anymore
If it looks rough or hazes
Sheet or patches on wing
Accumulation
Loss of shiny surface
Opaque or time expired
Change in gloss
Loss of the gloss of the fluid
Very hard
Same
Rough surface
When liquid becomes somewhat diluted & looses original colour under the leading edge you will get icicles of different magnitude
Opaque stripes
Freezing precip. glossy appearance difficult to tell from inside A/C Pellet adhere to A/C not melting
Slushy appearance
Is it sticking? Is it opaque? Can you detect a buildup?
Very difficult, use the most conservative holdover time
When ice pellets don't melt and ice seems to form on wing
Any accumulation on wing
Ice forming on leading edge
Holdover times
If ice pellets appear to be accumulating
Same
Loss of fluid's gloss and observing possible accumulation
Same, but more difficult because of added moisture content of freezing rain/drizzle
Same as above, As soon as wing doesn't look wet-but opaque in colour with slush buildup
More difficult-wing looks patchy not uniformly clear
If surface becomes less than shiny/smooth
Ice buildup
Delay T/O under these conditions
Don't know if I can definitely tell, under true freezing rain would be extremely conservative
Near HOT touch test
Look at nose of A/C for ice sticking
Rough surface, uneven
Roughness of surface
Difficult if HOT impossible

Contamination noted on surface of fluid
Loss of glossy sheen in areas where fluid is breaking down
Loss of gloss
Clumping up
Tough to do
Icicles begin to form where fluid is dripping
Loss of gloss on areas where you can see ice accumulation or actual pellets or areas of rough surface
Difficult to inspect without touching
Same
May not be obvious
"""""""
Visual inspection & viscosity no longer apparent
Difficult to see it adhering
Pebbly residue on wing area-rough vs shiny smooth contours
Loss of liquid sheen
Visible contamination on wing surface
By feeling the wing by walkaround
Loss of glossy aspect or by touching in case of ZR
Same as above
Same as above, holdover times, adherence to more visible parts of airframe
Shiny surface or grainy
Impossible - HOT must be adhered to
Surface texture appearance
Visible accumulation loss of wet glossy appearance
Ice pellets give bumpy appearance. FZDZ/FZRA almost impossible to identify
Sheen
Observing various points on aircraft
Rough surface (or perhaps the wind did it)
Loss of gloss and de/anti-icing fluid
Just use given (not approved) timetables
Accumulation
Fluid looses gloss, Freezing precip stays on wing
Rough edges
Loss of slick glossy appearance of fluid
Freezing on surface, loss of gloss, accumulation of ice pellets on surface
Can go into cabin to check flaps
Same as above but more emphasis on dilution of fluid
By touch
Shinny, texture coating on wing
Very difficult especially under poor light conditions. I rely on a high standard of spray and HOT
Precip will begin to liquefy or turn to slush on top of the wing
Very difficult - I prefer touch by hand for freezing RA or DZ
Similar. Ice accumulates & sticks to surface
Loss of gloss-frozen surface
Should not take/off, fluid unable to absorb all - precip on wing or on top of fluid
Either hazy look (rims) or mirrory (wings)
Leading edge/spoiler visible runoff
Grainy appearance
Reflection, accumulation of textured ice
Do not know (I spray it off (anti-ice) then use HOT charts to get an idea of deice effectiveness then look at the wings to see if precip is accumulating
The representative surfaces are no longer shiny/liquidy working, but begins to dull
Difficult, use HOT, use any visible ice on wiper on front windshield
If possible by direct inspection of wing
Build up or color/tone, textures change on wing surfaces
Touch - Note: it would be nice if ladders were more available near gate
Dulling of surface reflectivity progressive freezing of surface
Very difficult - rely mostly on holdover times only - especially with the tail
Mostly by time very conservative with these conditions
Loss of gloss of fluid, colouring clear out being diluted
Tactile - above random
Not used to this condition, good question
They would more likely dilute the fluid
Adherence to surface
Visible roughness of opaqueness to the above areas
Rain stops running off ice pellets bounce
De/anti-icing fluid begins to feel like ice. (fluid freezes)
The same as above or time
Clear, glossy look to moisture on wing/ looks like it's freezing
Shinny surface
Colour change, slush, touching wing
A change in appearance of fluid
Have to touch (especially at night)
Visually
Time limit running out.
Pre Departure - Have maintenance feel top of wing. After deicing - holdover time
Best way is to touch the surface
Surface freezing, build up of ice crystals in or on the fluid, presence of slush, etc.
Only go by HOT during these conditions
Granular accumulation, degradation of shininess
Ice over black strips on wing if lightning is good (daylight)
If precip is sticking to fuselage around or on window it is a good indication otherwise get someone outside to look at it
Hands-on tactile only
Dull and shiny textures
Increasing concentration of contaminants on the surface
Wings glaze
Movement and colour of fluid
Frozen droplets or rivulets with fluid draining away from sprayed areas
Slush or chunks visible. Fluid turns ***
Accumulation in wing
Noticeable build-up
Do not worry
Appearance of "depth" of moisture and roughness - droplets etc.
No longer smooth shiny liquid
Loss of sheen
Loss of colour, adhesion to roll spoiler deployment
Very difficult solid accumulation. Very difficult at night
Colour changes
Difficult - little experience
By visually checking for build-up

I use time (HOT) only
Unable able to see black stripes on upper surface of wing
I look for an accumulation of ice or snow that is sticking to the wing
Get out and feel the wing
Change in glossy appearance
Slush/granularization of remaining precipitation. Sometimes icicles hanging off trailing edge
Lack of smooth shiny coloured film (also applicable to snowfall)
Holdover times in conjunction with appearance
Look at the nose of the aircraft just below the windshield
Ice build-up
Get airborne well within the HOT, rotate slowly at much higher speed and feel for the wing to fly
Clear smooth shiny surface - isn't
Time
Visually & by touch
HOT & visual inspection
Thickness of contaminant increasing on wing/representative surface
Slush
Loss of viscosity
Going by holdover time
As above; but you can also notice or observe crystal like structure adhering to leading edge
Dull appearance of fluid
Fluid is washed away
However sometimes difficult to assess accurately due poor visibility from in cabin - external light/darkness a factor
Accumulation on representative surfaces
ZR adhering to the surface
Crystal pallets & rough fluid appearance with a hard crust appearance
Can see ice pellets on wing - do not know about ZR
Surface lose gloss become dull
White foam developing on wing
Formation on screen wipers
Wing inspection
HOT, spoilers, boots
Haven't had to do PCI during these conditions
Time
Adheres to surface as a rough finish
Tactile inspection
Can't visually with any degree of accuracy. Must be assessed by ground crew with access to *** of wing
Ice or drizzle sticking to wing surface (inspection visual or touch)
Accumulation and/or loss of fluid gloss
Loss of "gloss" appearance - impossible at night
Holdover time used as hard limit
Spoiler and timing
Very difficult
Raise spoilers (hard to see)
Same as above
Deice fluid layer looses viscosity & becomes sandy in nature
Ice pellets: build up FZDZ look at some protrusion
Accumulation
N/A - have not been subject to ZR ZL
Dull/opaque appearance as opposed to glossy wet look - also colour of fluid not present
Not sure because I have never had to look at wing in this condition
Very difficult. I use HOT for respraying
Diluted looking
Precipitation sticking to fluid
Visually very difficult from cabin window
Fluid fails to prevent ice from forming
HOT mainly & windshield wiper nut collection rate
Lack of visible fluid
In freezing drizzle/rain I would have difficulty - watch for buildup on probe
Huge difference between freezing rain and ice pellets ie. on sticks the other doesn't
Visual or actually feeling surface
Same
Ice forming
Feel the surface for clear ice build-up
Sticking of snow on surfaces
The wing will not have a shinny appearance, but will look dull
Evidence
Visual & touch of wing surface
Ice starts to accumulate
Slush or skim of ice
Precipitation no longer runs off representative surfaces
Holdover time exceeded
Difficult to do from inside A/C
Glazing/frosting
Ice pellets similar to snow, FZDZ & FZRA very difficult, rely more on HOT
Time or visual build-up
Visual glaze & feel
Deice boots loose their smooth shinny appearance
Sticking to the wing
Have never seen fluid failure in any condition
Build-up of ice pellets
Type I fluid icicles or presence of ice pellets in fluid
Colour, icicles
Representative surface shows contaminant
Close-up inspection only
Combination of: table & visual observation
Pellets not melting
Individual pellets sticking & manually feeling wing during freezing rain & observing wing patch to see if ice has accumulated
Strictly holdover time

C6. Is it easier to identify fluid failure during falling snow or during freezing drizzle/rain?

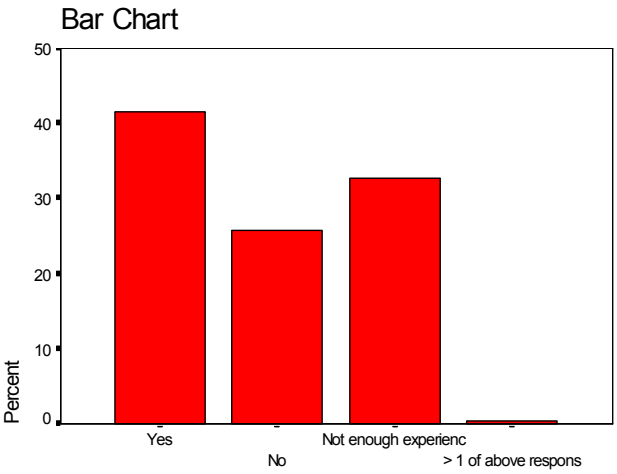


Comments:

Easier in snow - Very difficult in freezing rain
Easier in snow - Snow sticking quite noticeable
Easier in snow - Very difficult in freezing rain
Not enough experience - I believe it easier in snow
Easier in snow - The cues are more obvious in the snow
Invalid response - ?
Easier in snow - It would be much easier if we were shown videos or pictures of fluid brake down
Easier in snow - Clear ice on a wet wing most difficult to detect
Not enough experience - I have lots of experience flying but we don't spend much time looking at fluid - can't see wing from cockpit
Easier in snow - FZDZ, FZRA are difficult to judge
Invalid response - This questionnaire is a lot of bureaucratic crap
Easier in snow - Easier to detect snow buildup. Difficult to assess in FZRA
Easier in snow - Much easier to see without physically inspecting
Not enough experience - Nor training
Easier in snow - Unable to view closely from 767 OK from DC9
Easier in snow - Better visual indications
Invalid response - ?
Invalid response - Dont' know
Not enough experience - Rarely been in FRDZ/FZRA on the ground
Easier in snow - See C5
Easier in snow - Freezing precip is clear
Easier in snow - Freezing rain and fluid can look similar
Easier in snow - Snow is more visible
Easier in snow - Opaque slush forming is easier to see than FZDZ/FZRA
Both similar - Still have to feel wing
Easier in FZDZ/FZRA - Snow cover fluid and makes it more difficult
Easier in snow - Not trained for it
Easier in snow - Rain washes the surface and makes it difficult to see the fluid fail
Invalid response - No idea
Invalid response - It's impossible
Easier in snow - Unable to detect fluid fail with FZDZ unless tactile, specially at night
Easier in snow - You can see it easier, especially at night
Invalid response - See C2
Easier in snow - Type 2 fluid is vastly superior to Type 1
Easier in snow - See above
Easier in snow - More visible-lighting around airport can affect how easy FZDZ is to see
Invalid response - ?
Easier in snow - Large-wet flakes the easiest
Not enough experience - I would think easier in snow from the limited observations I have experienced
Easier in snow - FZDZ tough at night
Easier in snow - More contrast between precip.(snow) and FZDZ (than rain)
Invalid response - More info required
Easier in snow - High wing A/C it is difficult to see
Not enough experience - Have never seen fluid failure
Easier in snow - See above
Easier in snow - Self explanatory
Easier in snow - However I have not experience Type 4 fluid failure, and am not sure if it will react the same
Easier in snow - FZDZ/FZRA requires closer examination
Easier in snow - We check snow more often than freezing precip
Easier in snow - Certainly in heavy snow
Not enough experience - Not sure I've had fluid failure 1
Not enough experience - Never really happened to me due to good deicing procedure
Easier in snow - Wings look rough when snow falls & fluid stops being effective
Invalid response - Have not been shown fluid failure
Not enough experience - And knowledge/info regarding fluid failure
Invalid response - Don't know
Easier in FZDZ/FZRA - Never had to identify FZDZ/FZRA before HOT. (Yet)
Easier in snow - I think
Not enough experience - We seem to T/O well within the recommended HOT, fluid failure is a rare experience
Both similar - Depends on snowfall rate + moisture content
Easier in snow - Snow turns from clear to milky white
Easier in snow - Not really sure
Easier in snow - I would spray after freezing precip is over
Easier in snow - See above
Not enough experience - All experience with snow
Not enough experience - Insufficient training
Not enough experience - Refer to C1
Easier in snow - Easier to see
Not enough experience - Needed better ground school

Invalid response - Guessing, operationally take best guess, i.e. does it look safe
Easier in snow - Difficult to see deterioration in FZDZ/FZRA especially at night
Easier in snow - Type 1 - can see snow accumulation, FZDZ just dilutes
Invalid response - Have not seen fluid failure very often
Easier in snow - Note C5
Easier in snow - Unable to assess buildup in control areas
Easier in snow - Accumulation of ice harder to recognize
Easier in snow - Visual - loss of gloss
Easier in snow - FZDZ/FZRA can be very difficult to assess fluid failure
Easier in snow - Shining set wings are difficult to detect clear ice on
Easier in snow - A glossy look does not mean safety, much harder with rain or drizzle
Invalid response - Show me the video
Easier in snow - Less experience in ZL
Easier in snow - Good question. Possibly easier in snow as it will stick
Invalid response - Cannot recognize fluid failure- only wing contamination
Easier in snow - Prior to deicing. As snow melts into slush on wing the slush turns invisible in the melted water, but is still there
Easier in snow - FZRA or DZ will sometimes shimmer when the fluid is still working
Easier in snow - Very difficult to assess FZDZ/RA particularly at night - length of exposure become critical
Not enough experience - No idea, I'd be guessing
Not enough experience - No training in fluid failure
Easier in snow - More familiar with snow than FZDR/RA
Both similar - If you wait for snow to accumulate then you will see that first, but that is too late
Easier in snow - Must be very conservative in freezing rain conditions
Not enough experience - FZDZ/FZRA rare in area of operation
Invalid response - ?
Easier in snow - Both similar if physical inspection
Easier in snow - Even though I don't have much experience
Easier in snow - I should know this but I'm not sure
Not enough experience - See above
Not enough experience - Have only had to deice twice in 9 yrs!
Easier in snow - Clear ice should be detected by touch - difficult to see!
Easier in snow - Snow doesn't stick to/streak exterior of cabin window
Easier in snow - Snow adhering - thus patches of white easier to see
Easier in snow - By far
Not enough experience - Very rare to have freezing rain that is very heavy
Easier in snow - You need light to shine at the correct angle to get a shinny appearance
Easier in snow - As above
Easier in FZDZ/FZRA - Droplets will cease to turn fluid
Invalid response - I'd guess snow, but most of my deicing was for ice/frost/snow REMOVAL, seldom with snow falling, never FZDZ/FZRA

C6(b) Recognizing failure - Does the type of fluid influence your response?



Comments:

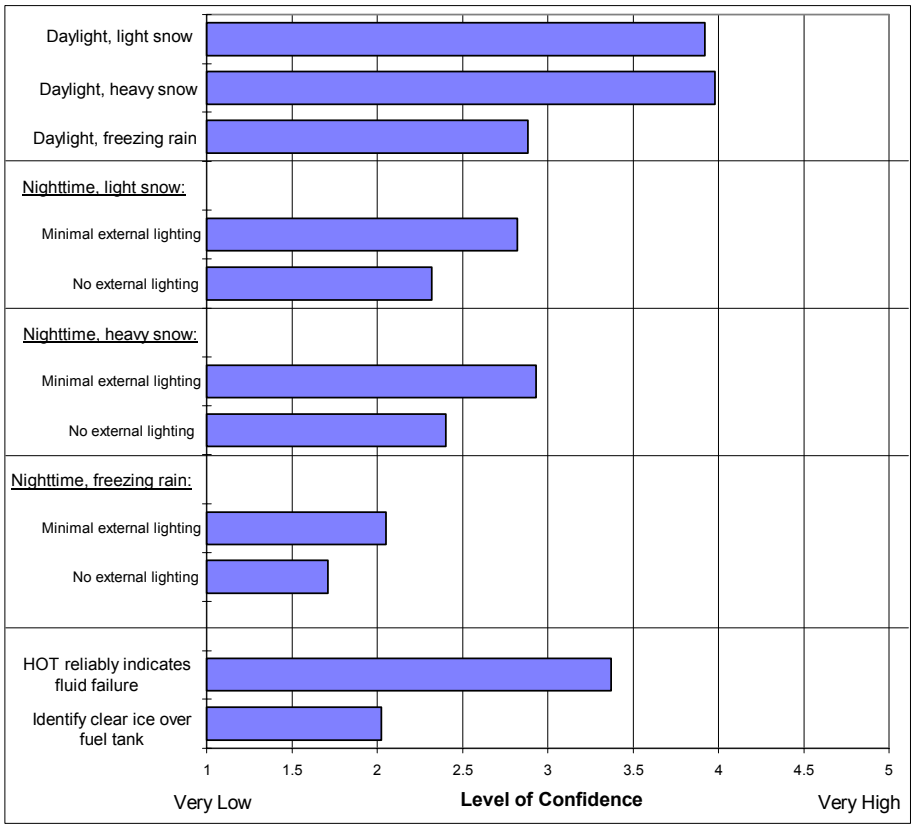
Yes - Type III is more difficult to see than Type I but is more effective
Yes - Type IV's ability to "absorb" moisture
Yes - More faith in Type IV
Yes - Length of time varies with fluid type
Yes - Type IV usually doesn't require a visual inspection due time factor
Yes - Be very cautious with only Type I, if there is any precip. and temps close to zero or below.
Yes - Type III is more difficult to see than Type I but is more effective
Yes - Type 4 fluid is harder to detect failure
Yes - Type 4 colour and particularly it's consistency makes it easier to analyze
Yes - Type 4 a lot easier to detect failure
Yes - I usually rely on published holdover times
Yes - Type 4 seems way better and safer period
Yes - Type 2 pink vs 4 green feel better with 4
Yes - We only use Type 1 fluids
No - Type 1 can be foamy this makes it difficult to tell if you have snow or foam
Yes - Easier if sticks longer (fluid)
Yes - Ultra is a confidence builder
Not enough experience - Only use 1 fluid
Yes - Get more Type 4 undiluted available
Not enough experience - Not enough experience with Type 2 and Type 4
Invalid response - We only use Type 2 (Western Canada)

Yes - Failure of Type 1 or 2 is easier to recognize than Type 3. But because Type 3 is so new I don't have experience with it failing yet
Yes - You know the holdover time
Yes - Less concern with Type 4 deicing during early part of holdover times
Yes - Fluid colour assists in determination
Yes - Type 4 is a God-send
Invalid response - I have always used HOT as my means of determining protection. I have had no info on fluid failure recognition. HOT expires, I would return
Yes - Type 4 not a problem
Invalid response - Don't know
Yes - More confidence in fluids with great holdover times
Yes - Type 4 is great
Yes - Thicker fluid 4 is easier to see.
Yes - Type 4 fluid superior, longer holdover & thicker which makes it hard to show fluid failure
Yes - Type 4 fluid most reliable
Yes - I like and trust Type 4 best for the long holdover time
Yes - Fluid type must match conditions & temperatures, if not failure of fluid is a greater concern
Invalid response - Not sure what you're asking here
Invalid response - Only fluid I have used is ADFXL5Y
Yes - Type 2 Ultra is the best. Congest holdover time
No - One must be able to think
Yes - More confidence in ultra 4
Yes - Type 4
Yes - Type 1 to Type 2 and accumulation
No - Only use Type 1 fluid
Yes - Longer fluid HOT reduces level of suspicion of fluid integrity
No - Use only Type 2
Invalid response - Re: Type 1 or Type 2
Yes - Ultra provides greater confidence
Yes - Some colours easier to recognize
Yes - Type 4 is easier than Type 1
Yes - Type 2 has greater staying power
Yes - Surfaces appear different depending on type of fluid
Yes - Type 4 better fluid
Yes - Type 4 HOT rarely requires inspection
Yes - Fluid type effects HOT, but little difference in recognition
Not enough experience - Only familiar with Type 2
Yes - Type of fluid being used
Yes - Type 4 much better accorded to literature on various type fluids
Yes - Type 2 & 3
Yes - Anti-ice fluid more value than deice
Yes - Colour (Types 3 & 4) are easier to see the results of "failure" in
Yes - Lower confidence to Type 1 due to restrictive HOT
Yes - Type 4 appears to the eye to be holding longer
Invalid response - We use only Type 1
Yes - Type 2 fluid is very good. I have been in moderate snow for 40 minutes on the ground with no failure of fluid-clean wing
Yes - Colour helps by giving a better contrast
Yes - Not experienced with new long holdover fluids
Yes - Type 4 fluid HOT times are more important than visual PIC's in snow condition
Invalid response - As above
Yes - Colour of fluid has identification
Yes - Type 1 looses it's suds (foam)
Yes - Less faith in Type 1 fluid
Yes - The heavier fluids are much better
Yes - Procedure used by Co. is well organized, timely deice followed by anti-ice fluid by experienced ground crew, equip. & best fluids available
Yes - Type 4 is great
Yes - Colour helps
Yes - I only Type 1 50/50 Glycol
Yes - Colour easier to see
Yes - Longer holdover times-conservative figures on charts
Yes - I have greater confidence when sprayed by Type 4
Not enough experience - Only experience with Type 1
Yes - Heavy duty fluid is a big help
Yes - Green Type 4 is superb
Yes - Type 4 much more efficient
Yes - Better fluid will clean easier
Yes - Type 4 could have visible snow on top
Yes - Holdover times are important
Yes - Rely on holdover times then deice again
Yes - Type 4 is excellent
Invalid response - Don't know
Yes - Type 2 is easier to see
Yes - The better the holdover time, the more confident when turnaround is quick
Yes - More confidence in Type 4
Yes - Type 4 can support an accumulation and still be effective
Yes - Type 1, Type 2 or 4 have heavier density
Yes - colour
Yes - Type 1 tends to drain off so any accumulation is easier to identify
Not enough experience - We only use Type 1
Yes - If not 50% Glycol I do not trust it to prevent icing
Yes - The difference being in the holdover times
Yes - Type 2 is easier
Yes - Whether Type 1 or 2 fluid are used
Yes - Newer fluids are much better
Yes - Newer fluids are more efficient
Yes - Higher comfort level of Type 2 or higher fluids
Yes - Type
Yes - Type 4 best
Yes - Type 4 would or might influence my decision
Yes - Holdover times vary, type of precip heavy, light snow, freezing rain also effect fluid
Yes - Did we get a deice or anti-ice spray
Yes - Only in level of concern coupled with HOT
Yes - Type 1 or 2 are deicing fluids with short HOT. Type 4 is an anti-ice fluid with significantly longer HOT properties
Yes - Type 4 is best, then Type 2
Yes - The HOT of Type 1 fluid is so short one barely has time to taxi to T/O point before fluid failure occurs in FZDZ
Yes - The thicker the fluid the harder it is to recognize failure
Yes - Much more comfortable with Type 2 to 4

Yes - Type 4 is thicker but again not really sure
Yes - Prefer Type 2
Yes - Type 4 easier to see
Yes - I have little confidence in Type 1, I prefer Type 3 Ultra whenever any hold time is required
Yes - Knowing holdover time of fluid application
Yes - Type 2 is better
Not enough experience - Refer to C1
Yes - Deice or anti-ice
Yes - Easier with Type 2 anti-icing fluids
Yes - Type 4 Ultra can be difficult because it melts the snow into a translucent slush layer
Yes - More confidence in Type 2 or 4
Yes - With Type 2 & 4 the HOT have more value than Type 1 HOT - doing a visual inspection with Type 1 is essential
Yes - Type 2/5 much better protection
Yes - Type 4 has much improved HOT
Yes - Type 2 Ultra best
Yes - Still gaining experience with "new" Type 4 fluid
Yes - Confidence in Type 2 & 4
Invalid response - See previous comment
Yes - More confidence in Type 4 fluid
Yes - Fluid viscosity changes crew ability to assess fluid failure depending on contaminated type
Yes - Type IV is my favourite
Yes - I have more confidence in the better de/anti-icing fluids
Yes - Increased confidence with old Type III new Type IV
Yes - Obviously I am more confident of wings condition if A/C has been anti-iced as well as deiced
Yes - Again - based solely on holdover times
Yes - Should outlaw Type I
Invalid response - Show me the video
Yes - Increased confidence with Type IV "Ultra" in changing weather conditions
No - Always identify fluid failure rate
Invalid response - Don't understand question
No - Same fluid all destinations
Invalid response - A good question. I know if it is only Type I fluid I'm very skeptical
Yes - Clear in Europe, hard to tell
Yes - Feel better about Type II or Ultra
Yes - Holdover time guidelines
Not enough experience - Only use Type I
Yes - The Type II & IV have a higher viscosity, therefore colour of fluid is indicative of it's quality
Yes - Type 1 looks the same all the time. Type IV looks either really good or really bad
Yes - Type II & IV fluids significantly improve time to failure
Yes - Ultra IV gives me more confidence
Yes - Type IV more effective and most used
Yes - Type II & IV, much longer holdover than Type I
Yes - The fluids with longer holdover times give greater confidence in proper fluid shear at rotation
Yes - More HOT available with Types II and IV
Yes - Only that HOT's are longer
Yes - Type IV provides greater security with the performance penalty
Yes - Type IV longer holdover time than Type II
Yes - Type IV after prolonged time (past HOT) shows failure a little slower
Yes - Type IV last longer
Not enough experience - We very rarely use Type IV fluid
Yes - Deicing fluid - should not be used for anti-ice
Yes - If Type I, will not accept as much contamination
Yes - Generally not too concerned with fluid failure if given Type IV
Yes - Type I vs Type IV
Not enough experience - I've only used Type IV once
Yes - I have confidence in Type IV fluid
Yes - Type II or IV I would rely more on holdover times due to lack of education and experience with these fluids
Yes - The Type IV fluid in use YYC & YYZ appears to perform better
Not enough experience - Use only Type I
Yes - Type II Applicable to swept wing/jet aircraft
Yes - Type IV less critical of surface when making observations
Not enough experience - We trust the fluid guidelines as published
Yes - Coloured fluid will help identify fluid failure
Invalid response - Don't know
Yes - Colour & HOT
Yes - Orange/green easier to detect than clear or old Type I - (blue)
Yes - Type IV certainly gives me more confidence
Yes - Greater confidence in fluid greater than Type I in heavy precipitation
Yes - Type IV (green) much better
No - Only Type I fluid used
Yes - Prefer longest holdover time
Yes - Gloss effect of Ultra Fluid
Yes - More confidence in Type IV
Yes - New type fluid is better
Yes - Type I is sometimes the only type available. Rain on cold soaked wing good for only 2 minutes or freezing cows
Yes - Type II Ultra & Type IV are different and better for heavy wet snow, FZRA
Yes - Different response time for different fluid
Yes - Dark colour aids in assessment

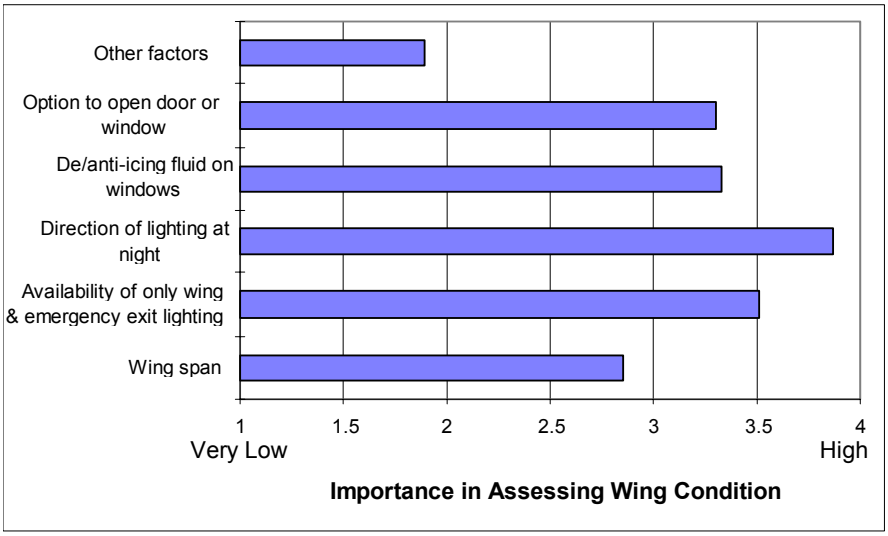
C7. How confident are you that you can identify fluid failure accurately under the following:

Factor Affecting Assessment	Level of Confidence in Assessment				
	V. Low	Low	Medium	High	V. High
Daylight, light snow	6%	7%	14%	32%	40%
Daylight, heavy snow	6%	7%	13%	32%	43%
Daylight, freezing rain	12%	24%	36%	21%	7%
Night time, light snow:					
Minimal external lighting (eg. on apron)	16%	23%	31%	23%	7%
No external lighting (eg. end of runway)	30%	30%	24%	12%	5%
Night time, heavy snow:					
Minimal external lighting (eg. on apron)	14%	25%	27%	24%	11%
No external lighting (eg. end of runway)	29%	27%	24%	13%	6%
Night time, freezing rain:					
Minimal external lighting (eg. on apron)	35%	35%	20%	6%	2%
No external lighting (eg. end of runway)	55%	26%	14%	3%	2%
Other Factors					
You can visually identify clear ice over the fuel tanks on the wing from inside the aircraft	45%	26%	16%	10%	3%
HOT reliably indicates the earliest the fluid could fail	6%	12%	34%	36%	12%



C8. Rate the importance of the following factors in affecting your assessment of the condition of the wing

Factor Affecting Assessment	Importance in Affecting Assessment				
	V. Low	Low	Medium	High	V. High
Wing span	22%	19%	24%	19%	16%
Availability of only wing & emergency exit lighting	7%	12%	28%	30%	23%
Direction of lighting at night	4%	7%	20%	37%	32%
De/anti-icing fluid on windows	15%	18%	16%	24%	28%
Option to open door or window to get better view	20%	12%	16%	24%	29%
Other factors	70%	3%	7%	8%	13%



Type of aircraft you currently fly	Importance to ID FF - wing span	Importance to ID FF - avail. of only wing & emergency exit lights	Importance to ID FF - direction of lighting at night	Importance to ID FF - de/anti-icing fluid on windows	Importance to ID FF - option to open door or window	Importance to ID FF - other factors
Twin Turboprop High Wing	2.49	3.11	3.75	3.04	3.18	4.04
	114	112	114	114	114	45
Twin Turboprop Low Wing	3.06	3.53	3.94	3.06	3.53	3.50
	17	17	17	17	17	6
Twin Turbofan - Max 70 pax	3.14	3.57	3.84	3.50	4.05	3.86
	74	72	74	72	73	22
Twin Turbofan - Max 150 pax	2.81	3.66	3.92	3.46	3.32	3.90
	248	245	249	249	236	80
Twin Turbofan - Over 150 pax	2.94	3.67	3.92	3.54	2.98	3.69
	100	102	101	98	94	26
Three Turbofans	3.00	3.11	3.67	2.78	3.97	3.36
	30	28	27	27	29	14
Four Turbofans High Wing	3.20	3.47	4.00	2.73	3.38	4.20
	15	15	16	15	16	5
Four Turbofans Low Wing	2.93	3.47	3.88	3.22	2.65	3.16
	60	60	60	60	60	25
Total	2.85	3.51	3.87	3.33	3.30	3.79
	661	655	662	656	643	225

Other factors:

I would say you've covered everything
(Other factors) Crew visual clues e.g. flight attendants
(Other factors) Opening cockpit windows, feeling above them
I would say you've covered everything
Ground crew, type of fluid i.e. color
Wind & precip type/rate
Ground personnel
Precipitation/blowing snow
Physical inspecting the top of wing
Wind
Depend very heavily on published holdover times
Other-Paint an outboard spoiler or aileron a dark contrasting colour i.e. red or black
Tend to use more then rep. surface, fuselage nose wing
Open aft doors to visually + tactily check fuselage + tailplane
Foaming fluid
Available time
Touch
Beneath wing, slush accumulation
A/P temp vs fuel temp boarded into main wing tanks - frost
Visual outside the aircraft +touch it hands on - use a ladder
Spoiler
Distance from wing area
Rate of precip
Day & night
Spoilers fuselage top
External lighting supplied by deice vehicle
Red coloured spoilers
Good rep surface
Overhead lighting on ramp
Walk around
Wind
HOT
Viewing other A/C
Visible spoiler
Comments from deice crew on the ground
Improve lighting on wing area
Ground crew
Type of fluid, time, outside weather
Nose of A/C
One does what is require Ice - no go, deice
External inspection
Size of A/C & cockpit location
Visual feel
Icing probe not deiced
The ability to actually physically verify conditions
Have someone out there examine surfaces carefully
Day or night
Good vantage point to view wing
Walking about
Rep. surface
Available stand to allow pilot to climb up & inspect/touch wing
Tactile & walkaround
Spoilers
Get a ladder
Ladder
Physical inspection
Touching the leading edge
Being close by
Time
Get out on wing
Wind, visibility/outside through cabin window
Ground crew/deice crew
Trained deice crew
High wing

Spoilers-clear windows
Touching
Spoilers on DASH 8
Escape hatch
Can't on B767, window contamination
Hand check before shutting door
My rep. surfaces are good and leading edges are well lit
Surface ice detect
Opening cockpit window
Get out & touch wing
Type of fluid, type of precipitation, temperature outside
Raise spoilers & observe
Actual weather at present time
Spoiler movement
Wind
Spray colour
HOT
Precipitation
Visual & tactile
Ground crew with gantry
equipment
"Ice man" check
Ground staff w/ladder
Wing spoiler panels
Running my hand over a wing
Tactile test
Location - wing so far aft.
Observations by others outside the A/C
Availability of ground crew to do tactile inspection & visual (close up) inspection
Deployment of outboard roll spoilers
Cockpit window
Escape hatch
Colour of wing
Extend spoilers
More light on wing surface
Ground crew
Wing contamination
Some climbs up and looks and feels the wing
A good representative surface
Tactile
Visual tail inspection
OAT, accumulation type & method of spray
Being able to visually and physically check wing

C8. Identification of fluid failure - Comments on factors or interactions between factors

Best method is for deice when to do a thorough & complete job, we depend a great deal on their expertise thoroughness. For instance we cannot see the horiz. stabilizer as it is on top of tail
It is capital to have a very good view of the wings as much lighting as possible is desired when in doubt, have someone outside to physically check the wing condition.
How much of the wing(span) can be clearly seen (lighting & clean window) affect how accurate your assessment can be. Precip. type/rate affect visibility. If accurate assessment cannot be made & any doubt arises as to fluid state, we go back to deice
Proper lighting is crucial inspection
On the A/C I fly FK-28 lighting is very important, especially direction. The wing inspection lights are good for looking at the leading edge in the air. On the ground there isn't enough lights to adequately see the top of the wings
The surest test of all is physical inspecting the wing upper surface prior to T/O. Certain conditions of freezing precip. should warrant external inspection by qualified ground crew just prior to T/O
Basically, if you can't get close to the wing and tail, it's a guess
C8-E Not practical on large aircraft don't even think of it
From inside aircraft especially at night it is risky
Ground inspection still
The larger the wing span the more area to inspect. Deice fluid on windows inhibit ability to check for ice
Visual plus tactile info the best
Often unable to see whole wing due to inadequate lighting so mostly dependent on temperature surface and/or holdover guidelines
Direction of wind on aircraft can cause a large variance in accumulation between representative surface and equivalent surface on opposite wing
The above would provide better visual indication of fluid failure
The procedures in place at the airline I work for provide a good variety of information as to the wing condition (not the tail) in icing conditions
Very difficult to assess wing looking through small passenger window covered in fluid at night
You must be 100% sure that you are ice free
Most A/C have other means of lighting to see leading edge
At night with cabin lights on, it is very difficult to lean over passengers trying to assess the wings.
Good to use cockpit flash light at night to help in judging on surface conditions
Completing a tactile inspection
Dependent on fluid type, precip. type & rate, tend to rely more on holdover time. In doubt, get deiced again and use Type 4 if available if any doubts exist over holdover time vs time to T/O
Some foaming fluids are hard to assess because the foam sometimes looks like snow contamination
Rep. surface just gray aluminum. At night in poor lighting it can be very difficult to ascertain with any accuracy the condition of the rep. surface. The rep. surface should be painted with high contrast Yellow hatch pattern
The only way to know 100% is to climb and touch the wing. Deicing should be at rwy threshold prior to T/O, means clear the equipment and apply full thrust
Wing inspection of little use as it is a fixed beam. Flashlight better for scanning. If you know what to look for fluid on windows is OK as long as there isn't too much

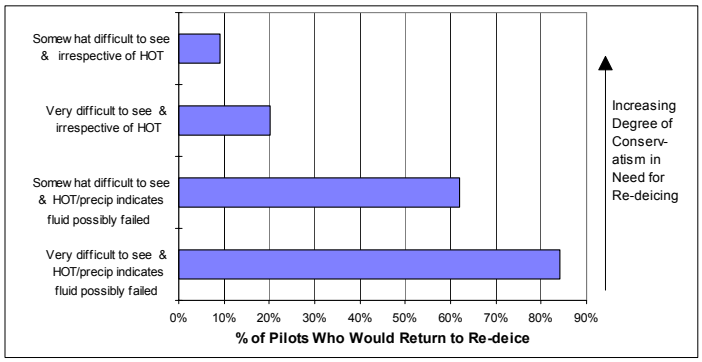
During landing & taxi, slush accumulation on flaps, landing gear etc. could degrade T/O performance as well as be ingested by engines
Wing span?
Lighting is obviously key, better view provides better info
Difficult to assess icing if freezing precip is obscuring visibility
With deice fluid on windows it is nearly impossible to clearly see the condition of the wing
Lighting from external source on deice pad very important light source at end of taxi prior to active runway would be useful
Boot condition, spoiler, top fuselage via escape hatch
Unable to see any part of wing from cockpit. Available lighting & external inspection from over-viewing exits with suitable lighting
Wing lighting a big factor at night. Realistically impossible to inspect a deiced wing from cabin at night away from a ramp area
Fluid on windows combined with poor lighting at night, makes for questionable assessment. Use of upper wing red coloured spoilers are of great assistance assessing upper wing, particularly on high wing aircraft
Our rep. surfaces are on the wings (spoilers) and can only be checked after startup. Opening a door is therefore not a good option for a high wing. The biggest hindrance is deice fluid on the windows and poor lighting directed at rep. surface
Visual of rep. surface is all one can really see on 767 certainly at night
Need to get out at wing level to do full assessment
All systems presently are seat of pants
Over wing inspection through a window covered in glycol is very difficult
Prior to T/O runway with better illumination of wings would better the visual inspection. I need to see the light reflections off surface (towards us best)
A/C type flown has good wing LTI and easy viewing
Fluid on windows is a "very significant" factor, I have had several instances of "opaque" windows due fluid. It's impossible to see wing conditions in these instances
Need clear windows in cabin + wing lighting at night
If critical I inspect condition of wing at ramp by climbing up a baggage belt loader & physical feel prior to spray. At the runway it is by visual inspection through the window
Once took off in FZRA, had ground crew spray both wings then tail then physical check wings - all while parked on runway - felt very satisfied that all was OK
Availability of access to top of wing, either directly or with squeegee, i.e. ladders. trucks, etc.
De/anti-icing fluid on windows obscures vision of wing completely
Tactile (or its equivalent instrumentation) is most important & least accessible specifically on tailplane, important because if inverted airfoil, inaccessible due height
Ability to stay well within HOT times
As required e.g. -40C, snow, do not apply fluid - do not trust fluid apply appropriate measures
External inspection when possible viewing touching & the wing as well as if possible assessing the fuel temp. inside the wing vs. OAT and moisture content of the air
On the B747 it is not possible to keep a constant watch on wing with out a crew member having to periodically go out of his/her seat
The only wise way for check ice is to actually touch the surface, however this is not that practical
Assessment of need for deicing evaluated best by standing in door well. After deicing fluid is applied, assessment is via the rep. surface which is very visible under all conditions from the flight deck
Visual inspection often unreliable, must depend on HOT
A low light scenario with anti-icing/deice fluid on the windows make visual confirmation almost impossible
With the wing lights on only the LE is visible, a flashlight viewing at over wing exit windows affords best assessment of wing
You're making a relatively simple procedure very complicated. There is only one person for all this- Dryden
A/C I fly has long fuselage, long wings & opening the door has little value in viewing wings. The light shining from ramp & A/C wing light make it a lot easier to detect contamination on the wings
The combination of good lighting and a good viewing point make the job of assessing the wing much easier
I've always been fortunate to be able to look out & see good fluid. We try T/O ASAP after deicing to eliminate these problems. If I don't have a good light I use my flashlight
Virtually always necessary to walk about A/C
I have not interpreted this properly
Our Co. uses pre-flt walkaround to determine icing on aircraft, then prior to T/O the Captain performs a tactile check on the nose ahead of his window which is the first area to be deiced
Put spoilers/wing lights on, visual inspection through PAX. cabin
The longer the wing, the darker the condition, the clearer the ice the more difficult to assess opening a wing door is not an option on my equipment
Very important to have clear windows over wing or at tail to see surfaces. Looking through ice + snow or deice fluid makes almost impossible to be certain about the wing
Important to see whole wing, the more light the better. If any fluid in the windows it's impossible to tell if clear icing-you might have to actually touch the wing to tell the difference between clear and deicing fluid
Closer you get to surface the easier it is to identify even better if you can feel it(some type of precip only)
In a dark area my wing inspection lights only illuminate the leading edge area, from this area I must make a judgment call. A/C needs better lighting for upper surface of the wing
Sometimes you just have to get out there and touch it in a few places

If you think your A/C should be checked before T/O get a ground crew to do it at the end of runway, do not try to judge from window
Overwing exit provides excellent access to assess effectiveness of fluid whenever cond. warrant I do not hesitate to visually inspect from the overwing door
I have flown many different types of A/C in many different winter conditions and I know what to look for
Although a PCI would be performed if HOT times were exceeded I would have little faith in it unless contamination was obvious. For the most part it is very difficult to accurately assess the conditions of the wing through cabin windows esp. at night
During snowfall med. to heavy I prefer to have the windows anti-iced with fluid so after a delay I could see outside anyway. Being able to open the back door on A-320 &B767 gives us a good look of the stabilizer & wings
Physical inspection the best way to make an informed assessment
OAT major consideration, how heavy is precip, did we get anti-icing spray, monitor HOT, stay clean, coordinate quick departure, use wing lights & cabin windows to double check buildup
Wing span can be seen on walkaround, deicing fluid on windows make it hard to see clearly. Good lighting certainly helps
Fluid on windshield is major problem due to obscuring of side view window. There is usually nothing available to clear side window
Clean windows & wing lighting are mandatory for monitoring wing condition
High wing aircraft are difficult to assess accurately
Our A/C type are DH8, one of the only visual means to assess the condition of the upper surface of wing is for flt crew to remove escape hatch & inspect, but because of obvious messy reasons our Co. policy is to look at outboard spoiler with it closed
Anti/deicing fluid on the windows always leads to a return if HOT exceeded. This is the most critical impediment to a pre-take/off inspection.
Accurate inspections from the cockpit are nearly impossible after fluid has been sprayed on the glass
Factors must be combined - ie. low light, night, blind on windows provide less confidence than daytime, clean windows & ability to go outside is necessary
Must have clean windows on both sides of A/C during daylight hours only. This is the only time I can make an accurate assessment
In truth really rely on HOT times - If exceeded require visual inspection from ground - in fact if possible should be inspection team at holding area just before T/O
Lighting of great importance opening doors is next best. Wing ice detection devices will help pilot make decision in demanding conditions
Condensation on passenger windows makes it difficult at times to assess conditions
Very difficult to accurately assess the wing condition from the A/C cabin lighting makes it almost impossible from the pax compartment and on large A/C the doors are too far from the critical surfaces. The vert. & horiz stabs cannot be seen at all
The wing must be clean beyond reasonable doubt to the experienced eye - If in doubt don't go
See C2 & C4
De-anti-icing fluid on windows block only way of checking for ice- opening cabin door not an option in winter with passengers on board -Poor lighting is also a factor at night
Should be sprayed right before entering runway. Within 2 minutes of T/O
It is very difficult to view wings from inside the A/C
I think I understood the above question. I answered as if only some of the possibilities were present at any given time
Other factors; did I fly A/C inbound to the station, ie. cold wing, OAT - particularly between +5C & -10C, Fuel-load, snow conditions under cold temp. ie. below -15C
Unless the condition of the wing can be positively identified, I would insist on a tactile inspection
Visibility from windows can be imperceptible at times - Opening of door almost impossible at times
A central airport controlled deicing program can provide consistency in all aspects of deicing operations
My wristwatch & the outside weather is most important. If I have just been sprayed then I am confident the A/C is clean. As time passes & intensity of precip increases I become less confident
All the above factors affect the others
A panel ie. spoiler which was painted with a reactionary material which would show green when deice fluid was O.K. and red when the water content in the fluid was high (from snow/rain) would help or wing ice sensors
I have in the past taken a ladder to inspect, looked O.K. but running my hand on surface proved otherwise
It's important that all the ice is removed and knowledge of that removal, whether a lifting surface or not
Fluid on windows not a major concern if does clear off some what sufficiently to evaluate condition
The amount of wing visibility from flight deck and related light (wing LIGHT) is invaluable. Fluid on heated windows - what effect??
We need some kind of wing surface probe that will tell us if the wing is safe or not. Anyone who thinks that scheduled air carrier pilots are making tactile exams of wings in difficult light/precip/vis conditions is dreaming.
If safety is a real issue why not make deicing the responsibility of the airport authority who could charge the companies per aircraft serviced and have them a deice supervisor come to the aircraft when next for take-off
I believe its important to have a good view of the entire wing. To have illustrated to the
If on 747-400 you do not open over wing exit it does not close
I fly DHC-8's -Another factor of importance is the quality of equipment and crew at the base and their ability to quickly and effectively spray you and get you on your way

Traffic ahead is a large factor, blowing snow etc. Direction of lightning coupled with fluid on windows makes viewing very difficult
Although one can see the leading edges from the flt deck and they appear to be clean, I don't believe an accurate assessment can be made from this position
If in doubt - go out and look
Light condition - key to proper assessment day? night? lightning?
I am only 100% confident when I can visually inspect and using my hand touch the precip. on the wing
The two most positive indications are still a last minute exterior observation and/or recently introduced electronic sensors
N/A B-747-400 rely on ground crew
OAT, fuel temperature
No options, if in doubt, go back and re-deice again. If your concerned with visibility you don't have enough
Direction and intensity of light source very important. Clear icing with high head only reliably assessed by ground level or at wing inspection of leading edge upper surface and far touch
I have used an aft door to assess wings when windows were difficult to see through, and found it useful
Deployment of roll spoilers prior to take-off gives an accurate indication of whether the fluid is shearing, since the spoiler extend to a vertical position
With the type of aircraft I fly its very hard to see any part on the wing
HOT times cannot be not with temp -6 +0 C in busier airports - due to tow ons/offs deicing areas therefore visual inspection become absolutely mandatory and yet at night looking thru pax windows its very difficult to be absolutely 100% positive that
Experience teaches - we all have different comfort levels in assessing conditions. The most important thing is - when in doubt return for another spray - no matter how tight the schedule/pressures. It is critical that HOT times have reasonable reliability
You have to see the wing and lights help. Out the window is fine if its clear. If the door is close it could help to get a view
Lightning of wing at night is bigger factor
They all relate to being able to see the condition of the wing - is this a questionnaire or is this a test?
Need better lighting of wing area & clear windows overwing!
Representative surface. Nose area viewed forward from the cockpit. Deice crew comments/opinions. Information from other pilots, dispatch OPS etc.
Better lighting on wing would improve the assessment on the aircraft I fly
Seeing the wing/touching the wing can be extremely important. This can be difficult on a high wing turbo-prop. Ladders help
Opening doors and windows for last chance inspections is not a reasonable solution. Good lighting of representative surfaces should be made mandatory in all aircraft manufacturing and should be modelled to suit all aircraft subjected to operational icing
External lighting (A/C) very important
Also report from deice crew
Note: In high wing A/C e.g. DH8 spoilers deployment is virtually the only method to inspect upper wing surface while taxiing for departure. Visibility therefore generally poor. Holdover times very important
If I cannot get a very satisfactory visual assessment I don't have any hesitation in going outside and observing/feeling the wing along the entire span, with ground assistance if necessary
Accessibility to inspect wing surfaces closely - is to touch
Top of wing cannot be seen well at night especially while away from terminal or secondary light source
Personally use timing and the amount of precipitation fallen
Deicing fluid on windshield (happens a lot) obscures view to wing. Open door to get a better view is very impractical at YYZ. Have to take some ones word that wing and elevator are clean
I trust that the fluid is applied as require and that it performs as the data indicates. If these times are exceeded I would return to deicing area. Simple
Ramp lights on terminal reflecting off wing is a must to me in the dark even if I do a tactile because of my limited reach overwing. Obscuration of screwheads on topside of wing is a dead give away of fluid failure but requires a clean cabin window to
Most times need outside visual inspection
If lighting OK (which it is on type flown) find assessing surface adequate, company standards of high quality and fluid used latest technology therefore comfortable with visual from inside on both wings prior to T/O if delay encountered
Certainly the difficulty in definitively determining whether there is contamination on a wing surface in this high tech age is a great problem. Time to take the step ladder out and a flashlight and be certain
I fly DHC-8. Determination of wing contamination is made by observing the A/C's representative surface. In this case the spoilers
Direct communication with ground crews to discuss rate of build-up very important. Often freezing precipitation turns to rain as time goes on. Ground crew must be well trained
C8E not an option/fluid on windows obscure vis./ Also following other traffic has an effect
Light is often poor at night, windows are often frosted over or have other visual problems that make it almost impossible at night to see, and very difficult during the day. The only way to be sure is to have a well trained and experienced person
Any factor make assessment of icing more difficult e.g.. low light, contaminated windows or distance from surface being inspected. Option of opening windows or emer. exits for inspection is unproven from the point of causing internal contamination and
Clear ice on DC-9 very difficult to see. One must be able to physically inspect wing. Stand on ladder and physically scrape and check for ice. One occasion I opened over wing exit and checked the wing myself!

Night conditions cause more concern to ensure all wing area visible
After spraying there is an inherent amount of trust that the job is done properly. Once at the holding bay for T/O it would be nice during inclement WEATHER to have designated company crew to perform external checks of especially the tail sections!!!
Intelligent answer would be forthcoming if questions were being answered during icing season rather than middle of summer
High wing - even in optimum conditions only the leading edge and spoilers are visible. Personally I rely mostly on a fairly conservative application of HOTs.
Obstructed vision (due to deicing fluid on windows or precip) in combination with poor lighting makes visual inspection impossible in some cases & dubious in others. Opening cockpit window removes 1 of these factors, but no help if lighting is inadequate

C9. If, just prior to take-off, you make your best judgment of the wing condition and cannot identify whether the fluid has failed or not, would you return to deice again under following circumstances?

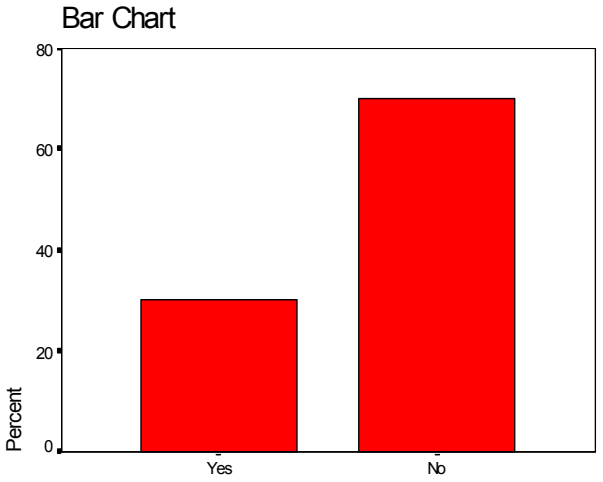


Note: top response is very conservative, bottom response is not conservative. Bars on graph assume that if pilot re-deices under one condition, he will re-deice under conditions below that in the chart. 15% indicated that if they could not identify fluid failures, they would only return to re-deice if delayed and subsequent inspection revealed fluid failure.

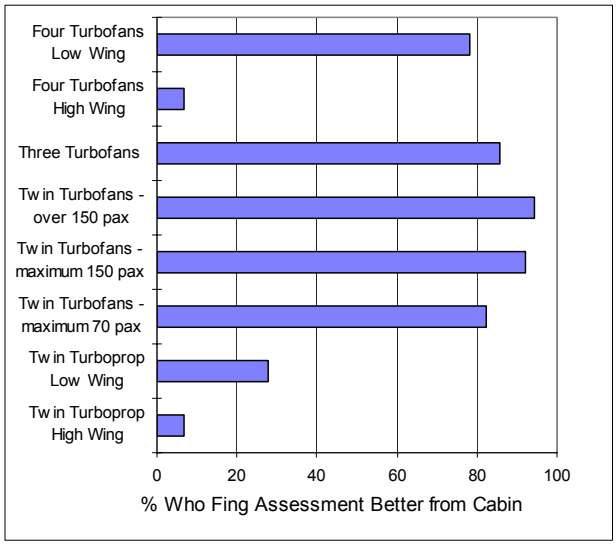
Comments:

If visible, contamination exists, yes
Confusing questions. My policy, if I am not 100% sure of wing condition, I don't take off
It depends on conditions if unsure would return
None of the above I would go back
Yes, if I could see ice or snow on wing area
Yes I would there is no contest here. If in doubt I would go back to be deiced again
It depends on the amount of precip - Very light - heavy?
I would return if I had any questions whatsoever
There is more to it than this. One should not make decision based on regulation
If due to heavy precip. I have reason to assume failure & cannot identify failure, I would return to deice
Is T/O delayed because long lineup of traffic or is the pilot delaying it to get re-inspection. If I can't see it I go back
I would return for re-inspection then possible deice
I do not try to judge
If the time limit has been exceeded & not sure visually, would return
We don't use the HOT method in Canada
HOT are guidelines, if wing appear contaminated, I return
If there is any doubt we return to get a re-spray
If holdover time has elapsed and subsequent inspection revealed fluid failure (i.e. irrespective of HOT and visibility)
Invalid response - Only if the "time limitation" had expired and condition's warrant a return
Very difficult to see - Return!! Poorly formulated question
Invalid response - It would depend on if I was not exceeding min HOT by much
Neither: what's the weather doing?
If you cannot determine if fluid failure has occurred you would return for re-application
If in doubt, go deice again
Just return to gate for deice
If I cannot identify I will make an outside inspection
Many more factors apply to this question - airmanship & experience are paramount
I would stick to HOT for go/no go
This question is too ambiguous. If I was in doubt I would return to ramp
Yes anytime I'm unsure
I am not sure I go back period

C10. On the aircraft you fly, is it possible to conduct the pre-take-off inspection from the cockpit?

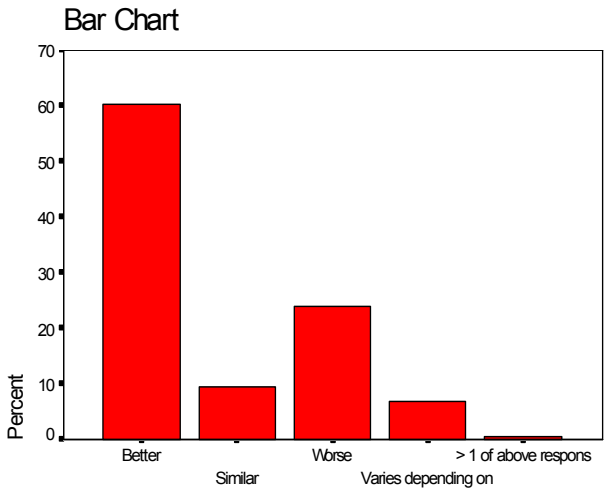


On your A/C can you conduct the pre-TO inspection from the cockpit?



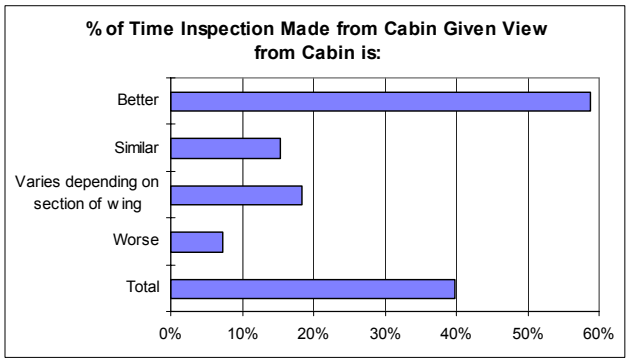
If Yes,

a) From your experience, can you make a better assessment of the wing condition from the cabin or cockpit? The cabin is

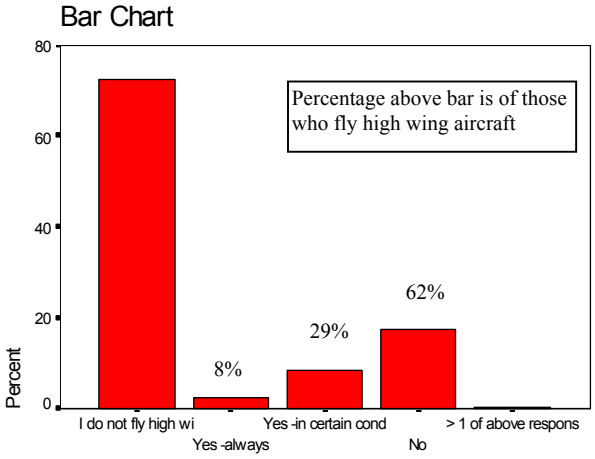


Assessment of the wing from the cabin or cockpit? The cabin is:

b) Please give the % of time you make the inspection from the cabin



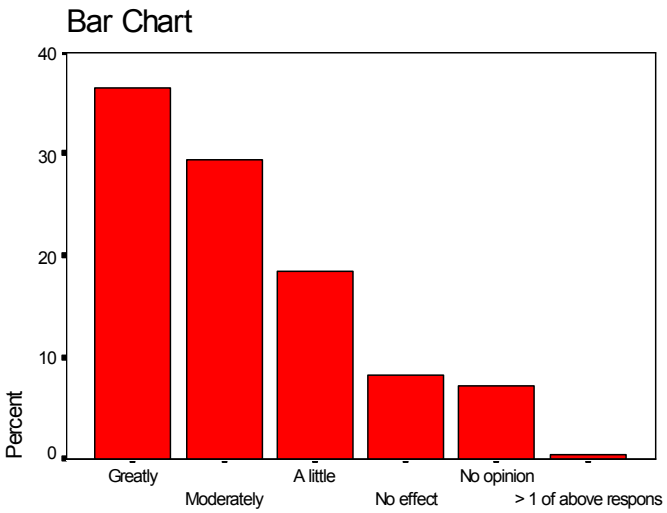
C11. If you fly a high wing aircraft, when conducting a pre-take-off inspection do you open the door and visually inspect the upper wing surface?



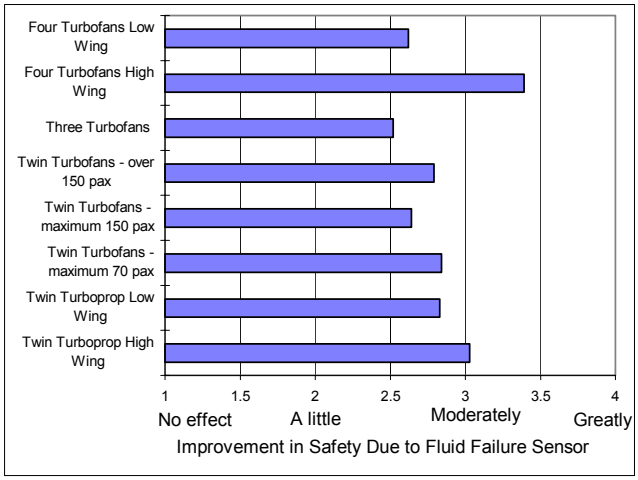
Comments & conditions under which they would open door and visually inspect upper wing surface:

Yes -in certain condition - When roll spoilers questionable (Rep. Surf.)
Yes -always - Yes for preflight, No can't open door when engines running for pre- T/O inspection
Yes -in certain condition - Pre flight & in conditions of possible heavy icing
Yes -in certain condition - If the situation warrants getting close to HOT, heavy precipitation, and/or delays
Yes -in certain condition - If I have any doubt
Yes -in certain condition - If feel needed
Yes -in certain condition - Moderate-heavy precip
Yes -in certain condition - Heavy precip(snow) or poor spraying facilities (can only be done before leaving ramp)
Yes -in certain condition - If icing suspected
Yes -always - DHL-3 Otter climb on top to inspect
Yes -in certain condition - If spoiler (rep. surface) gives ambiguous indications
I don't fly high wing aircraft - I only fly High wing A/C for business purposes. A/C is not flown with ice on surfaces
Yes -in certain condition - If unsure of the surface contamination
No - It's covered in fluid and dark at night
Yes -in certain condition - If rime on previous approach
Yes -in certain condition - If I'm concerned generally I look at other places for info
Yes -in certain condition - Prior to deicing cockpit hatch opened for visual
Yes -in certain condition - Near freezing
Yes -in certain condition - Heavy snow, poor vis.
Yes -in certain condition - Precip. or can't see rep. surfaces by night
Yes -in certain condition - If roll spoiler cannot be illuminated at night
Yes -in certain condition - If in doubt has to what can be seen from the cockpit
Yes -in certain condition - When conservative HOT exceeded
Yes -in certain condition - No ground crew
Yes -in certain condition - Before start up
Yes -in certain condition - While at the gate
Yes -in certain condition - If any icing conditions exist or have been encountered
Yes -in certain condition - Icing potential present i.e. snow, etc.
No - Any doubt I return - opening hatch would cause $100,000's damage to A/C avionics
Yes -in certain condition - When uncertain during mod/heavy precip
Yes -in certain condition - When I am unsure of wing condition
Yes -in certain condition - In icing or possible hoar frost conditions
Yes -in certain condition - While holding just before runway
Yes -in certain condition - I always do some kind of inspection depending on the severity of contamination
Yes -in certain condition - If in doubt of wing condition we open cockpit escape hatch to "look and feel" surface
Yes -in certain condition - Tail surface & trailing edge of wing
Yes -in certain condition - Freezing precip & close to the take-off point
No - Any fluid on the roof of the escape hatch would flow into the cockpit and over everything
Yes -in certain condition - Emergency cockpit exit
No - Impossible
Yes -in certain condition - To determine need to deice
Yes -in certain condition - When at the gate prior to start
Yes -in certain condition - Only on gate
Yes -in certain condition - In conditions of ZR\ZD heavy snow HOT close to expiring
Yes -in certain condition - When not confident in the training of ground personnel or very adverse weather
Yes -in certain condition - If unable to determine from inspection sections
Yes -in certain condition - Icing conditions
Yes -in certain condition - If I'm unsure of ground crew
No - Probably should however impractical to the point that you can't do it
No - Even with door open - can't see top of wings to assess contamination
Yes -in certain condition - Only if representative surface is questionable
Yes -in certain condition - That is, holdover expired and fluid obscuring view on window
Yes -in certain condition - When on the ramp e.g.. before engine started

C12. Would a signal in the cockpit linked to sensors capable of identifying fluid failure located on areas of the wing where the fluid typically fails first improve safety?



Would sensors for identifying fluid failure improve safety?



C12 - Comments:

No effect - I would not trust them
A little - Initially I believe the would be a high degree of "suspicion" of reliability if however over time it was proven to be accurate I would say greatly
No opinion - Never used this type of device. Possibly another electronic device to go wrong. (Could be used as a reference but don't make this mandatory).
Moderately - It would make the task easier
Greatly - Takes all guess work out of decision
A little - The best decision I feel is made by a visual inspection
Greatly - Assuming such system could prove to have an extremely high accuracy & reliability. False warnings are worse than no warnings.
Greatly - Of course it would, if it worked.
No opinion - Cannot comment since I do not know abilities or limitations of any such system
No effect - I would not trust them
No opinion - Depends on it's reliability if not 100% effective, forget it. Best to rely on ground or flight crew
Greatly - The answer is yes with a strong precondition. The sensors would have to be widely spread about the wing and be infallibly accurate and have a failed annunciation capability. If any one detector should fail, to revert to HOT & pilot observation.
Greatly - I have flown high wing A/C and I presently fly a T-tail jet. I have no way of knowing what is happening on top of the tail. On the F-28 it is the most critical flying surface
Moderately - If it worked
Invalid response - ?
Moderately - Depend on A/C type. No effect for my type of A/C
Greatly - Where would you get such a marvelous machine? That would be reliable?
A little - Current procedures error on the side of safety. Any additional mechanism to detect fluid failure would enhance safety but isn't necessary
Greatly - Presently identifying clear ice on wet wings and fluid failure during liquid freezing precip. by visual internal inspection is far from foolproof. More accurate means are necessary
Greatly - For sure
A little - The entire subject is not an exact science. Experience and a prudent attitude on part of the pilot are the most important factors for a safe operation
Greatly - The more to detect the better don't you think
No effect - Sensors would become another problem
Moderately - I fly a high tech A/C the simple ice detection system fails regularly and quite often a computer reset resolves the problem
A little - I don't know enough about that type of system
Greatly - Allied Signal makes one. Must be very simple to use and is easily seen location in cockpit. i.e. Green go - Red no go
No effect - A negligible improvement at a huge cost
A little - Reliability a big factor (I feel the survey's purpose is to be used by Transport Canada to have all commercial operators install sensors Looks like the decision has already been made but they need these questions to support the cause)
Invalid response - I flew an A/C (F28) that had ice detectors for the engine inlet area They were not reliable
Greatly - Can only see representative surface on high wing
A little - Some people would say "it only signaled a short time ago, we will be OK"
A little - I feel we are totally safe the way we do it now
A little - Don't think a system exists
Greatly - Large area on our high wing aircraft cannot be viewed (only representative surfaces)
A little - Where are the sensors, what type, what are they measuring. Do they know OAT + Types of fluid + precipitation, wind etc.

Moderately - Subject to rigorous testing for high confidence and reliability
No effect - I am completely satisfied with the system we presently have
A little - During a wing inspection my focus is on a clean wing if the wing is clean the fluid is working
Moderately - Can we trust these devices?
Moderately - Great tool but could become too much of a crutch. i.e. don't bother checking unless sensor indicates fluid failure
Greatly - Is this technically possible? Call General Electric
No effect - Believe this would be another pacifier, unnecessary worry in flt deck which many may solely depend upon. Airmanship should be the factor. If in doubt visually check by best available means. Captain is responsible, but ensure crew ground/cabin are aware
Greatly - Any safety related device would be a great asset to pilots as long as it consistently gives good information
A little - Can't and shouldn't replace visual inspection
A little - Present methods, depending on crew, adequate
Moderately - Must be in conjunction with visual inspection
No effect - Sensors fail also
Moderately - I find it difficult to see how sensors could accurately determine fluid failure. Cost & reliability? (Many factors to be considered under when and how the fluid comes to fail)
A little - This would have to be fairly reliable and still decided on visual inspection
No opinion - Do think the trained eye is better at detecting fluid failure
Greatly - Another tool to work with
A little - I normally use type of precip. and HOT. If precip. or HOT is reached I have visual check of the wing done just before T/O then make a decision for a return to ramp or an immediate T/O
A little - Ground crew positioning at threshold of runway can't be beat
Moderately - As long as normal procedures remain in effect
A little - Would provide to backup to HOT/precip tables if conditions are variable of deicing poorly conducted or fluid mixture incorrect
Greatly - Any information we can get in addition to what we already have will help us make better decisions
A little - Only if very accurate. No false alarms
A little - Difficult to say, what type sensors? How serious a fluid failure? Hard to judge since virtually all my takeoffs are within the HOT
Greatly - If installed the PIC should be able to disregard the annunciation of his/her disgression
No effect - Who is to say the sensor is working properly
No opinion - One more system that can fail
Moderately - Greatly if reliable
No opinion - Gadgets are not to be trusted. There is enough bullshit in there already. P.S. 1000' is dangerous and ridiculous! You guys are looking for accidents
Greatly - As long as it's reliable
A little - Could result in more delays that may not be necessary
Moderately - Other area could suffer failure first
Greatly - Would to helpful as an extra aid to assess fluid failure accurately
Moderately - Would nice to have another aid to help make an informed decision
No effect - Must not use spot sensors need overall view. See Spar aerospace new remote sensing
Moderately - System would have to be reliable and not become "THE" item by which decision is made, but rather an item in the assessment of fluid failure
A little - Failure of sensors could create a bigger problem in extra deice cost time delays, etc.
No opinion - Would like to see such a system in operation before assessing its effectiveness
Greatly - This would really help in poor lighting i.e. at night
Greatly - Would allow areas unable to be seen give an indication
Moderately - Depends greatly on the reliability of the sensors
A little - I'm not sure how well that type of system would work - false alarms might be a problem and this make it useless
No opinion - I would like to see test results before I make an opinion
Greatly - It would help eliminate the uncertainty with the decision process relating to fluid integrity. See QC7 and any response that has not been rated 5
No opinion - Not sure if this technology has been proven reliable
No opinion - Depends on the technology
Moderately - Sounds good, but insufficient tech data to be conclusive
A little - Very difficult to install a reliable sensor on a large wing
Greatly - It would be great to have the extra input on the condition of the wing
A little - Pilot may rely on sensors and not make visual inspection
No effect - A visual inspection in conjunction with HOT is the safest approach Keep it simple
Moderately - Any extra info helps the decision
Invalid response - Difficult to answer. I suspect that under average conditions there is always some % of fluid failure. Over-reaction and legislated knee-jerk produces anxiety in pilots. Take away control and results can be adverse
No effect - Such a device would enhance safety for those who treat icing casually but I don't and such devices rarely work very well
Moderately - I have no experience with such sensors
Greatly - If they work consistently and reliably
Invalid response - Unsure

No opinion - This would depend on the reliability of the sensors - sensors function would help moderately
Invalid response - Sensor system would have limitations, therefore a pre-T/O inspection would still have to be completed with a tactile inspection would be requested
Moderately - If sensors are predicated on time & atmospheric condition then it becomes similar to HOT parameters which are guideline only. Final responsibility will still be flt crew vis. assessment of individual situation. Technology will never remove responsibility
Greatly - Would remove some of the guesswork
A little - If sensors could be trusted
No effect - Typically, What if the area that typically fails first, fails last..
Moderately - A responsible pilot will not T/O if in doubt the wing could be contaminated, regardless of any warning system
A little - Visual inspection is best
Greatly - See C8
Moderately - It would not be as good as a visual inspection
A little - Any assistance in a fluid failure scenario (very poor weather) helps
Invalid response - Probably?
Greatly - Also video sensors mounted on top of tail showing wings
Moderately - A question of reliability comes to mind
Moderately - It would give a better idea whether to do an inspection. Our flight attendants are briefed to look in these conditions by the captain
Greatly - So long as the sensors were accurate
A little - Only if such systems were proven reliable in all conditions. Confidence in such systems is a key factor in their usefulness
Moderately - Sensors fail
Moderately - Sensors would have to be tested in the real world over a period of time to allow exposure to the icing environment normally present during a typical Canadian winter
Moderately - Where good visibility is available to the pilot the sensors should act as another tool to help make a decision go or no go
Moderately - Reserve higher confidence in the system until proven to be accurate and reliable
Greatly - Very positive indication + saves times
No effect - I have experience with similar devices, which proved to be unsatisfactory
A little - Ensuring proper application + reduced time on ground would likely be as effective or even more effective than sensors. If receiving anti-deice closer to T/O point
Moderately - For the type of A/C I have flown I do not think it is necessary as the wings are not that critical
Greatly - If it worked
Invalid response - In Canada A: In sense that all this legal activity about icing has not really improved safety in Canada, adding more equipment won't change anything i.e. 1000 X0 is still 0. B. adding foolproof equip. would make the whole thing a non-issue
Greatly - Providing system failproof and accurate 100% of time otherwise some pilots might ignore it part of time if system inaccurate
Moderately - It all depends on the accuracy of the signal
Greatly - Add tail
A little - With all other means available to us, it might be hard to justify the cost for that little an improvement
Greatly - Good luck finding an accurate sensor
Moderately - See comment C8
Greatly - Provided I had faith in their operation
A little - Mechanical contraptions eventually fail. (Would this be an MEL item for the winter)
No effect - One would have a natural mistrust of such a device
Greatly - In some atmospheric conditions it is difficult to see well enough to pass sound judgment
Moderately - It would be just another aid same as an alert by cabin crew. I would trust a visual inspection more than an indication. If ice is OK we go
A little - As most systems are not 100% foolproof or reliable, I believe it would be a useful addition, not replacement of existing procedures
Moderately - Provided false alarm rate was enough to ensure signal did not become a nuisance
Greatly - As long as it is relatively foolproof
No opinion - If system is accurate & reliable (100%) it will be of great value, if not will be disregarded by crews
Invalid response - Only if the sensor itself is 99% reliable
Greatly - Only if it worked unlike ice detectors - most don't work and have been deactivated
Greatly - This would provide a great backup to other safety measures already in place. It could also alert a crew to fluid failure during situation where they might not be expecting it
Greatly - There are many times that fluid failure has been close. If I'm not sure I'll always go back, by placing sensors would I now stop trusting my instincts and go with sensors. What if sensors inop.
A little - It would often make life easier, Safer? I'm not sure?
Moderately - Would still have to be visually verified
Greatly - Visual inspection after being sprayed is frequently done in dark area (taxiway at night) with deicing fluid still dripping over and smearing the windows
Greatly - Looking out window covered with Glycol is a waste of time and tells you nothing, especially at night
Moderately - Can't always rely on sensors
Moderately - How could they not improve safety?
Moderately - But only if it was 100% accurate & never failed. Otherwise most companies would avoid the expense and rely on their pilots' experience & trained eye to recognize contamination
A little - This would leave nothing to pilot judgment if this is mandatory return to Deice
Invalid response - You guys are full of it! Leave the decisions to the captain - one person ****ing up the system and you guys go nuts with procedures for idiots and create an empire

Invalid response - Probably
Moderately - Would still need to confirm visually as well, but good idea
Moderately - Would take out the guess work
No opinion - Suspect that with so many variables, that false warning or no warnings may occur
Greatly - Subject to the integrity of the sensors
Moderately - Nothing can replace a good visual inspection under ideal condition i.e. light and easy of accessibility
Moderately - Any additional info/indicators would be helpful in a PCI
Moderately - As long as it was deiced prior to T/O to prevent high-speed rejects for no reason on slippery runways
Greatly - All for it
Greatly - Fluid failure assessment on high wing A/C is difficult
Greatly - In high wing A/C fluid failure is difficult/impossible to ascertain on wings
Invalid response - It would all depend on how accurate this system would be
No opinion - Perhaps
No effect - I would hesitate to put too much in a device that may or may not function in extreme conditions. Even the best technology will fail
A little - All depend on sensor
Greatly - On B767 you don't see the wing or the engine from cockpit. So you can only rely on HOT & when in doubt you have to go back to cabin and visually check the wing
Invalid response - Unable to answer, not an engineer. However yes, nothing better than a visual inspection
Greatly - Flying a 340 I rely on HOT, since it is awkward to get up & walk back to look at the wings (have had F/O do so on occasion) Sensors would help a lot
Moderately - Not a bad idea but if it gave false alarms people would begin to ignore it
No effect - It would overly complicate a simple process
Invalid response - I think this is a waste of time and money
A little - Where the sensor would be located, it would only give a spot assessment. Maybe if combined with actual procedure
Greatly - The technology would have to be such that it would be highly accurate, so that unnecessary delays are avoided
Invalid response - Sounds like a very expensive way to gain a marginal improvement in safety
A little - Just gives more info to flt crew to ascertain the surface of the entire wing
No effect - Accuracy of sensors would have to be proven. Would be questioned for a long time
No effect - A signal would be far too sensitive and pilots would start to ignore it
A little - A sensor would just be another tool to assist the PIC in making his/her decision
Greatly - Only if the sensors were reliable
No opinion - They would have to be reliable all the time
Moderately - Only if sensors could be reliably proven accurate
A little - I could not rely on sensors alone, they would be a helpful tool
Moderately - If they were made so they were reliable
Moderately - It would help or would or might not cover areas where snow/ice has blown in by wind or jet blast. Would probably still require visual go/no go
Moderately - Depends on reliability
A little - Well, every little bit helps
Greatly - There is nothing like being able to see what is happening out there
Moderately - As long as this didn't become the only detection
A little - Could be wrongly influenced by other A/C, failure etc. (May not be trusted at all times)
Greatly - No sure how this would work but a great idea
A little - I would be more concerned about failure of sensors than my own judgment
Moderately - Depends on how accurate/reliable a system could be designed
A little - What about false warnings? System is good now if all play by the rules - no need for more expense
Moderately - As long as the sensor is accurate. If it continuously gives erroneous indications, it will be soon ignored
A little - Too many environmental factors influence the wing disportionately. It is not a uniform environment along the wingspan
A little - Not unless detect entire wing
Moderately - If it's totally reliable
Moderately - All aids are welcome but I presently have high confidence in procedures in place & management attitude toward winter OPS at my carrier
Greatly - Must be proven first with and use in Canada and far North
Greatly - On most aircraft it is difficult to properly assess wing contamination from the cockpit
Moderately - Would I trust the sensors?
Greatly - We need help to identify fluid failure under demanding conditions, e.g.. freezing rain
Moderately - Sensors must be valid enough so not to give false indications
Moderately - If reliable
No opinion - I would be skeptical of its accuracy and would not want to rely on it
Greatly - Should be installed in all commercial transport plane
Moderately - Most devices fail more often than human assessment
A little - One more light that may or may not be reliable, cause delays
Greatly - Only if the reliability of the sensor system is failsafe. Otherwise visual is the best way to be sure
Moderately - The sensors would have to be very reliable and accurate otherwise their credibility would be too suspect to make much difference

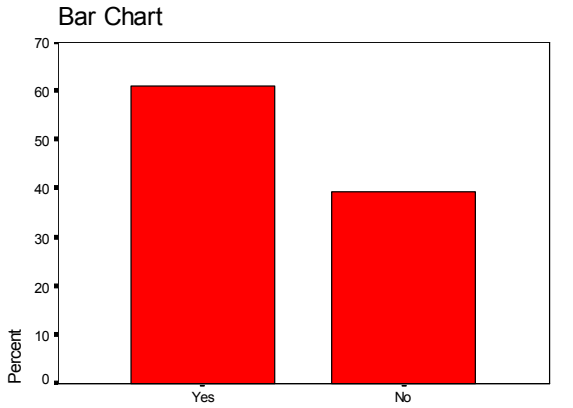
No effect - Another gadget which could fail. And which is probably expensive, weighs some kilos, and has to be maintained
No opinion - Insufficient knowledge of technology
Moderately - Signal reliability
Greatly - Visual inspection methods for DASH 8 are marginal at best and poor in poor lighting and weather
Moderately - As long as the system was extremely reliable
A little - My experience with icing sensors is not good. On all types of A/C I have flown they have eventually been de-activated due unreliability
Moderately - I have concerns with the reliability of such equipment
A little - Cost would not justify this!
Greatly - It is the only way in large transport A/C
Greatly - We rely on ground personnel - so something independent and in cockpit would be good
No effect - Wouldn't trust sensors
Greatly - Only a reliable system that could be trusted
A little - Show me the technology/application before I can realistically comment
Moderately - I suspect the sensor would only give you an indication of that 1 small spot. Nothing in my opinion is better than an external visual inspection
Greatly - Combined with HOT
Greatly - Provided false or ineffective warnings or indications were not a factor
Moderately - I want to know the condition of the wing from root to tip along the line of maximum lift
No effect - I would not rely on the system alone
A little - As most new technology, it is not as good as looking and touching
Moderately - If it works
Moderately - Visual check & knowledge of precip. & associated effects still the best, quality of fluids used & accurate HOTs assist greatly
Greatly - Sensors would be of great value as long as they are used in conjunction with current assessment techniques
Moderately - Grave doubts on reliability of such a system & accuracy of complete wing assessment
Moderately - But this depends on the reliability and accuracy of the system
Moderately - Would be most useful under changing conditions, particularly at night
Moderately - There is still a lot to learn, but this could be a big help
A little - It would depend on how accurate the readings were and how much confidence the pilots have in the system
Moderately - At this time I don't know the reliability of this type of system & am skeptical of its accuracy due to my lack of knowledge in this area of fluid failure sensors
No effect - Sensors are useless because they can fail
Moderately - If it is reliable
No effect - My & my airlines present policy and procedures are safe. No improvement required
No effect - Both wings must be clear for T/O period. If there is any doubt a visual inspection is required for both wings
Greatly - If it is also possible - there are so many factors affecting fluid effectiveness and HOT that I question our ability to produce a reliable device that would do this
Moderately - Reliability of system would need proving - sensor and HOT would be some what compatible
Greatly - Long overdue
Greatly - On the A/C I fly, the deice crews tell me the tail ices up the worse, it would greatly enhance the go - no go decision
Greatly - I would think any device which would assist in determining fluid failure would be a plus
Moderately - Providing the system has been live tested and proper training on system description and operation has been evaluated
Greatly - May prevent bad judgment as to return to deice
Greatly - As stated: the industry is fooling itself with all these procedures and visual checks in bad condition and tactile checks. What a joke. Good fluid and wing sensors; end of discussion
Greatly - But there's already airport equipped with airborne ice warning system that were de-commission because they were not fully reliable
Greatly - Sensors should be mandatory on aircraft flying in icing conditions or while operating in icing conditions on the ground
A little - No matter how effective they would be it would still not guarantee a clean wing
Greatly - Visual inspection is most inadequate external manual inspection best sensors would greatly enhance confidence when approaching HOT
Moderately - A sensor of that type would help improve safety because anything to add information to sensing ice can only help the crew make the go/no go decision
Moderately - Only if it didn't give false indications. So you then choose to ignore it. The device would have to be fool proof
No opinion - How will this work
Greatly - If the sensors gave a reliable indication of fluid failure it would help immeasurably in making the decision to return
No effect - Maybe for light aircraft - under 1200 lbs
Greatly - Provided you don't get a lot of false warnings or you'll get into a cry wolf situation.
Greatly - Again, very difficult at night
Invalid response - A man in a cherry picker (with good lighting) and located at the departure end of the runway would probably be a more reliable lower cost alternative
Greatly - If such a device could be proved reliable
A little - The technology has to prove itself first. What is the experience - It might if I had confidence in the system
Moderately - No auto system in 100% only complete assessment by the PIC (or his delegate) can ascertain the degree of safety involved, i.e.: subjective issue objective assessment
Greatly - Who gets to work out all the bugs first!

Moderately - Give further redundancy to visual inspection requirements. Nothing can replace visual inspection fully
Moderately - The sensors can't cover the entire wing so safe to fly signals would not always mean that you entire wing is clean
Greatly - If it is a usable sensor! ie. a micro video camera and good lighting!
No effect - Would not trust sensors - would still check visually regardless
Invalid response - This only complicates the issue. There is no substitute for a physical exam
Greatly - I have seen these in operation and they are extremely accurate and reliable
A little - I would prefer the end of the runway 'carwash' method as absolute safety against ice on T/O
Greatly - At fuel tank
A little - Depends on reliability of sensors & accuracy
Moderately - I would not rely on it but if it indicated a problem before HOT expired, I would be duty bound to honour it
Greatly - But how realistic is it to design/install such a sensor?
Invalid response - How many sensors, how many can fail? Then you look at wing anyway. Makes more sense to have deicing bay at runway ends
No effect - Not for Ultra IV fluid is very long. In the event it is exceeded, a trip to the cabin to examine the wings is an effective way of assessing fluid failure
Greatly - Other than getting a ladder its very hard to see the wing. Opening door does not let you see the wing properly
Greatly - Sure as long as its accurate instrument that works in all conditions
Greatly - Obvious benefit
No effect - We have more than enough ways now to determine safety. Sensors are the last thing we need. Too many people who don't know much about flying or airplanes are inventing stupid gadgets that cost lots of money and don't provide an useful purpose
A little - Prevailing winds may cause a variety of areas to accumulate snow therefore lowering the accuracy of sensors
No effect - No data to support this type of sensor available. Would doubt this would justify the expense
Greatly - Of course. Yes
A little - Another tool to make your assessment, however I would continue to evaluate precipitation, HOT, and would still consider a visual pre-take off contamination inspection
Greatly - High wing is hard enough to see in the day. At night extremely hard to see due to lack of lighting. A sensor would greatly help
Moderately - In one or two instances per year when confronted with difficult icing situations
Invalid response - Probably, although I have never seen these and do not know how they work
Moderately - If proven reliable
Moderately - Especially at night in low lightning conditions, and also for longer taxi times
Moderately - Would take some of the guess work out of it
Greatly - Would love to see it!
Greatly - HOT values are probably conservative yet local phenomena e.g.. wind speed & direction jet blast from other aircraft etc. are not taken into consideration
Moderately - Depends on reliability of the sensors
Greatly - Great idea
Moderately - Yes, if it works
Greatly - On DHC-8 last chance inspection is done with roll spoilers. Lighting is very poor on wing top and is difficult to conduct a confident judgment
Greatly - Any additional info will help
A little - If it was accurate & governing over doing a PCI, and had the confidence of the pilots it would improve peace of mind. If not, its' a waste of money & time for the mod.
Greatly - The A/C type I fly, the fuel tank area can not be seen from the open cockpit window. While this is the best way to view 70% of the wing, it is a major handicap to be unable to see this critical section
Moderately - I would be reluctant to see mandatory deicing based on a sensor when experience leads to high degree of skepticism regarding false warnings from ice indicator systems
Moderately - On a large A/C it is virtually impossible to visually assess the condition of the wing especially in poor light conditions. Sensors would definitely help
Invalid response - Unknown
A little - How reliable are these sensors going to be???
No opinion - I would question the reliability of the sensors
Moderately - As it would be a new system - confidence level would be low - also would require a method of self test and is further item that would require MEL consideration
No effect - In fact could lead to more problems. Nothing beats going to look and if you can't tell deice again
No effect - Not required. C8
No effect - I believe it would be a night more to use/legislate/enforce. I would much rather see cargo compartment fire detection & suppression installed
Greatly - When windows are smeared or at night this could very well be the only reliable means of determining fluid failure
Greatly - It must be fail safe
A little - May improve safety at times where HOT has not expired but due to heavier than recognized precipitation fluid has failed
No opinion - Our system of inspection both flt crew and ground crew appears to be of high quality therefore unable to comment on this question having not seen one
Moderately - Visual still required if sensors are only on certain areas. Would help make decision easier if difficult to see entire areas
Greatly - Yes but this signal could not replace visual inspection and HOT

A little - Only if system proven very reliable
Moderately - Reliability is critical to acceptance
Moderately - More than sensor required. I would question their accuracy for all conditions
A little - Only if sensor proves reliable beyond point of nuisance
Greatly - Ambient conditions affecting HOT are rarely similar from flight to flight
Greatly - I rely on HOT unless unusual circumstances exist or there is doubt about wing condition, sensors would probably be more accurate than looking out a cabin window especially at night or low visibility
Moderately - Is there such a thing?
Greatly - As previously started it is very difficult to see wings at the best of times, almost impossible at night, so a reliable sensor would greatly help
A little - I believe level of experience more important than sensors
Greatly - See A3
Moderately - While it would give a better indication people may rely solely on the system & not bother to visually inspect as well
A little - A visual inspection is the only way I feel comfortable departing under icing conditions
Invalid response - The reliability beyond a visual inspection would have to be proven beyond doubt
Greatly - If we can assume accuracy this would help to remove negative company cultures from interfering with operational processes
Greatly - Not familiar with icing sensors on the wing but sounds like a good idea
A little - With improved HOT's it is very rare to wait on ground longer than the HOT (Type II) - but more important knowing how often the most advanced technology fails, I consider visual inspection generally more reliable than sensors
Greatly - Anything associated with improving safety would be an asset
Greatly - Procedures still rely heavily on judgment ("guesswork").
No effect - This can be solved by locating deicing bays closer to T/O position
Greatly - 1. Tactile inspection immed. prior to T/O is impractical in any large A/C 2.Visual inspection is at best an educated guess, esp. in adverse conditions of lighting, window contamination etc. 3.Reliable technological means is likely to be most accurate & practical

D. PROCEDURES

D1. Are you, or would you be, comfortable with a ground deicing program which allows take-off within the specified HOT without conducting a further pre-take-off inspection?



Comments:

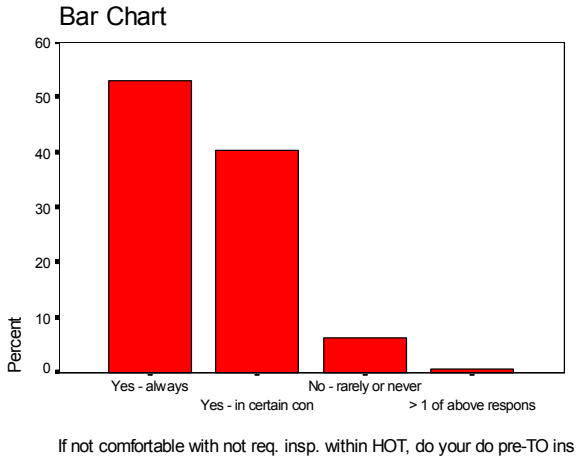
No - You must always check
No - Too many environmental factors affect HOT
Yes - If it's left to our judgment.
No - If I have doubts about holdover I will check wings before T/O at all times
Yes - This is now what we have, no?
No - Not always, I have seen sudden severe changes in my life I do not blindly trust the tables, I trust feeling it.
No - You must always check
Yes - Only if it was done at or near the button of the departure runway
Yes - I need to be confident of application procedure that the fluid being applied is that advertised and that that fluid is properly mixed
No - Still would check
Yes - This is the current procedure
Yes - Depending on intensity of freezing precipitation
Yes - Based on captain's decision as to whether conditions necessitate an inspection
Yes - Work load is already very high in congested ground traffic, poor visibility, night time operations. No procedures that increase pilot
No - There are too many factors affecting holdover times
Yes - Deicing should take place prior to T/O
Yes - That we do now
Yes - As captain I could still ask for an inspection
Yes - Provided no reason to believe HOT invalid/inaccurate/adversely affected by other factors
Yes - This does not preclude factoring in other factors e.g. precipitation rate
No - I want to know myself (usually)
No - Although current procedures support this concept
Yes - Because we routinely inspect wings from the cockpit not the cabin

No - I will always rely on an inspection
Yes - However if weather is severe or there is other reason to inspect the surface I would
Invalid response - Only if confidence in agency was very high
No - Not safe if very heavy snowfall base
Yes - Depending on weather conditions
Yes - Heavy precipitation rate
Yes - Using common sense, if close to your HOT expiration time and conditions are extreme, visually check from cabin by best means
Yes - Depends on precip. type and rate
Yes - Better fluids are available
Yes - Depending on type and amount of precip.
No - I will always be the judge
Yes - We use most conservative to current conditions i.e. snow is always heavy snow
Yes - Except for freezing rain
No - Visual inspection should be done unless no precip present
Yes - However other crews may take that too far
Yes - Ifit is deemed very low risk
Yes - We already have one with our carrier, where the inspection is done with a ground crew at the deice centre
No - Blanket statement does not account for environmental variables
No - I believe some kind of visual is always necessary
Yes - Still want to see myself, though
Yes - Consistent with the cockpit references
Yes - Provided that HOT weather conditions are the same as observed outside the A/C
No - Visual inspections should be as required
Yes - At the threshold of runway
Yes - Isn't it what we do now? I can still inspect the wing if I wish even if HOT not expired
No - I trust myself only
Yes - Deice should take place just prior to T/O if this is not possible then an inspection is done always
Invalid response - Maybe, all depends on the program
Yes - Unless in heavy precipitation
No - Depends on precipitation at the time
Yes - So long as HOT are reasonable
No - Still should be inspected
No - Inspection re-confirms
Yes - Providing I have trust in those who do the deicing, so far I have never found weakness in this area
No - "on time" pressure would increase on crew
No - Depends on precip
No - More comfortable with last chance inspection
No - There are too many variables to preclude a P.T.O. inspection
No - Too many factors involved i.e. temp/precip rate etc.
No - PIC should always visually confirm aircraft free of ice
No - What if they missed a wing
No - PIC to decide if req'd
Yes - Assuming precip conditions don't prompt inspections
Yes - If sufficiently conservative
Yes - Depending on precipitation
No - Prefer visual
No - Not always
No - Flight crew will always make a final inspection
Yes - It is what we are presently doing
Yes - Except under extreme icing conditions
Yes - All depends on how much precip
Yes - If Type 4 were used or conditions greatly improved. i.e. stopped snowing
No - Fluids and HOT are not that reliable- conditions vary too much - visual is best
No - Need visual
No - Captain's responsibility
No - Responsibility is with captain only
Yes - The option always remain to check if there is any doubt as to a clean wing
No - Too many variables to cover all circumstances
No - Heavy snow or FZRA
No - Too many variables present. Even if fluid testing was sufficient to allow such a procedure under all conditions still should inspect
No - I want to look
Yes - Except in obviously heavy precip (see below)
Yes - Pilot common sense
Invalid response - What? I thought that you said this questionnaire was vetted by many? The above statement is the case now.
Yes - Yes provided ground crew de/anti-icing aircraft performs a check to ensure no fluid failure once spraying is completed
No - Not much confidence in reliability of ground crew observations
Yes - Depends on type and amount of precip.
No - Weather changes occur rapidly and only the pilot's visual inspection can cover all situations
Yes - Depending on conditions
No - HOT cannot cover all conditions in our vast country, heavy precip, in lineup behind jet blasts etc.
No - Every situation is different
No - Too many variables
No - Would still be asking to ensure no one was present by checking other things on side as well
Invalid response - Dependents on many factors i.e. tech. of. fluids, weather conditions, A/C type, etc.
No - No substitute for visual inspection
No - I want to see the clean wing
No - HOT is only a guide
Yes - It may have stopped snowing
No - Pre-T/O inspection very important
No - Too many weather variables
No - Conditions are always variable
No - Let pilot judge the conditions
Yes - Depending on severity of precip
Yes - Confidence in fluid within HOT
No - In precip, but not after defrosting A/C
No - Must check it
Yes - Providing no doubts were subsequently raised by crew members or passengers
No - Too many variables
Yes - Except in unusual circumstances

Yes - Always check rep. surface
Yes - Unless you are close to HOT
Yes - If we can prove that HOT is never compromised. Always safe
Yes - If certain other parameters are included(ex max. surface winds)or other items that could affect HOT also prefer to do final T/O inspection
Yes - I would still monitor snowfall rate, also freezing rain etc.
No - You always should check
Yes - Do it at the bottom
Yes - Standard ops
No - Too many variables
No - Would prefer to confirm visually
Yes - Provided conditions are not extreme
No - Need to see wing at least partially
Yes - It would not keep me from conducting inspections if I were at all suspicious of the surface condition
No - Would still like to see wing
Yes - Unless precip conditions changed drastically
Yes - Except in very bad conditions
Yes - ATC
No - Prefer inspection
Yes - Would check if conditions warrant
Yes - Under light precip - No under mod. heavy precip
Yes - Depends on precip. rate
No - I want to see a clean wing
No - Individual conditions would need to be assessed
No - Need more info
Invalid response - Depends on precip conditions
Yes - Only in very light precip
Yes - Strange question-too vague
Yes - Deice trucks parked at the button
Yes - With a visual inspection from cockpit
Yes - HOT minus 10% of time (safe side)
Invalid response - Somewhat, however inspection doesn't cost anything so why not do it
No - Bottom line is still PIC's responsibility
Yes - And would prefer the times increased to reflect fluid properties. Not aircraft specific
Yes - But there are many variables which might warrant a further inspection
Yes - If conditions as per guidelines
No - Inspection from the cockpit only takes a moment
Yes - With higher level of fluids Types 2-4 & with shorter taxi times
Yes - If reliable
Yes - Understand HOT to be quite conservative & A/C type is leading edge slip equipped i.e. no over critical
Yes - If correct fluid used
No - Always check
No - Precip as guideline
No - Not always
No - I always check HOT regardless
No - Visual inspection of surface
Yes - Provided precip is not moderate to heavy
Yes - Must be close to runway
Yes - Good airmanship may require inspection regardless of HOT
Yes - See other comments re uselessness of visual on large A/C
Invalid response - We don't use HOT method
Yes - To a large degree that is what we do now
Yes - Conservative HOT's though!
No - Depending on severity of weather
Yes - Ideally deicing just before T/O
Yes - For the most part but, under certain conditions pre-T/O should be done
Yes - Guidelines for this would be very restrictive - if exceed HOT must be allowed to do a visual & go if able
No - It depends on the weather
Yes - Depends on fluid type
Yes - Like in Europe deicing at the button
Yes - This is currently permitted
No - Visual inspection from cockpit always done following spray & always prior to T/O in our OPS
No - Would do visual inspection at least regardless of "program"
No - The two go hand in hand
Yes - If HOT was 20 minutes I would be comfortable with departure within 5 minutes(i.e. 4X safety factor) of being assured A/C was "clean"
Invalid response - Not enough experience
Yes - If conditions change during Taxi or a F/A reports accumulation of snow an inspector is done!
No - Precipitation conditions continually change during taxi for T/O
Yes - That's what we do now - taking into account variations in HOT due to ambient conditions
No - Human error always a factor
Yes - Yes with the right fluid
No - There should always be some kind of an inspection
Yes - However, the final call for T/O must remain to the PIC Not some form of "Ice Police" with no concept of valid experience in flying
No - Mother Nature
Yes - "Allows" does not mean you cannot should you have a doubt
Yes - Depends on pilot experience
No - See B5
Yes - Only if deicing is conducted at a runup bay for the active runway and deicing is coordinated with ATC for no delay for immed. T/O
No - Wing condition is never black or white
No - Are HOT that reliable? I think not.
No - What's the weather doing!
Yes - We do it this way now!
Yes - With a good Type IV or better fluid except in extreme conditions
No - Final decision has to be based or the circumstances i.e.: heavy snow, freezing rain, etc.
No - Ambient condition dependent
No - We always do a last second check
Yes - If it is a deicing gantry sitting short of runway lines
Yes - We have that program now. A PCI is not conducted if we are within the specified HOT
Yes - Nothing precludes pilot's discretion & further examination
No - Too many variables for a "blanket" approval. It would be safe sometimes

No - Times would have to be so short it wouldn't be practical
Yes - If deicing personnel had more training
No - We always check a representative surface (spoiler panels) prior to T/O
Invalid response - Leave it up to pilots discretion
Yes - We do it now unless we suspect the situation is worsening, then we inspect anyway
Yes - Depends on precipitation rate
Yes - The HOT must be conservatively assessed for the prevailing conditions
No - Depends on the fluid & precipitation
No - Always check visually
Yes - But let common sense prevent
Yes - Only in a fluid was developed that could guarantee reliability, - otherwise no
Yes - My airline requires P-T-O inspection on every T/O in snow, ice, etc.
No - Must have visual inspection i.e.: remote camera - link to TV screen in cockpit
No - If I feel it necessary I check the wings
No - While HOT seems to be reliable, an inspection when conditions permit (before HOT expires) costs nothing & is a 'last defense' against failure
No - HOT are so short it is impossible to become airborne within limits in today's ATC environment
No - Too many low paid contract deice crews
No - Never
No - We always check leading edge & spoilers prior to departure
Yes - With the added caution of taking other information into consideration e.g.. answer to C12
Yes - Apply airmanship PTO inspection when considered necessary
Yes - Up to the pilot, dependent on conditions
No - Lots of different factors
Yes - But only if I have confidence in the deicing crew
Invalid response - Depends on conditions, ie. temp/precip, wind, etc.
Yes - HOT seem to be quite conservative
Yes - Depending on program
Yes - Inherent started conservation of HOT/fluid fail characteristics
No - Redundancy
No - Pre-take off inspection should be done in extreme cases
Invalid response - Depends on weather conditions
No - Not at first, have to see how it works
No - HOT cannot cover all WEATHER conditions
No - Not if conditions warrant inspection
Yes - I find HOT are conservative
No - I would like to inspect just prior to take off
Yes - Holdover times seem to be accurate
Yes - Depends on the day
No - That leaves a key element out of loop
Yes - We do this all the time
Yes - With realistic times
Yes - All conditions favourable
Yes - Depending on conditions
Yes - Fluid type specific
No - Provided you have a representative surface to make your judgment
No - The specified HOT cannot predict all weather conditions
No - Always look
Yes - In most cases
No - You cannot generally predict a weather condition to generate standard HOTs

If not comfortable with a ground deicing program which allows take-off within the specified HOT without conducting a further pre-take-off inspection, do you routinely make a visual pre-take-off inspection in these situations?

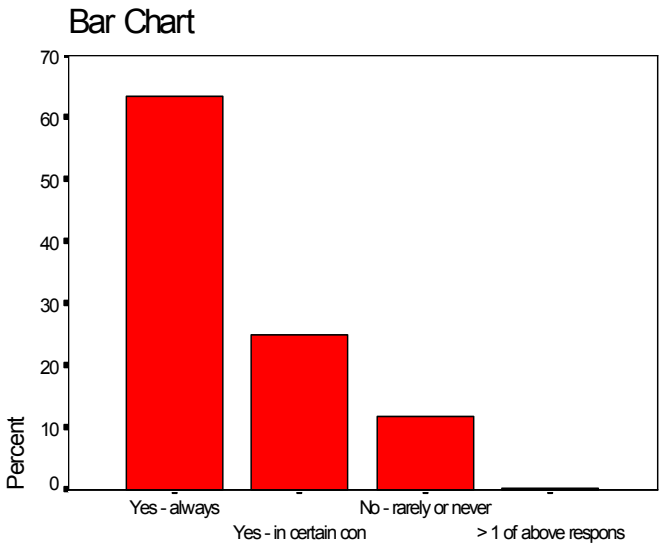


If Yes - in certain conditions, please specify:

High wind/jet blast
If precip. is falling and getting close to holdover time
Strong wind, jet blast
Depends on snowfall (visibility) and time required to taxi to runway - e.g. 35M VIS and 2 minutes taxi-inspection-OT RBQU
Precipitation/ heavy freezing fog
Freezing rain Type 1 fluid
Precipitation
Yes - always - Noting external situations i.e. A/C, RPTS
Yes - always - But this is easy to do from cockpit
Yes - always - On representative surface
Freezing rain is worst
If existing conditions warrant - i.e. Aircraft exhaust, high wind, heavy snow etc.
Change in precip. intensity
Depends on weather conditions, wind, jet blast, precip.
Any doubt
Wind, who I am taxing behind
Not if precip. has stopped
When warranted
When approaching HOT limit

Freezing precip
Yes - always - In no precip. condition, no inspection warranted
Freezing rain - heavy snow
If I am doubtful I inspect
Long taxi due to HOT + type of precipitation
Heavier precip. than expected
Knowledge of ground crew & procedures
Heavy precip.
Precip. is gray element
If precipitation is present
Heavy snow/ice
Heavy precip
Heavy precip
Precip
Invalid response - I always if there is any precip
No - rarely or never - Call for it
Depends on precip and temperature
Depending on weather
Depending on need
Heavy snow or freezing precip
Heavy precip/near HOT expiry
Heavy snow, also time dependent
If HOT or type of precip in question
Such as a change in the weather conditions
Heavy snowfall - longer delay
Heavy precip
During precip
Invalid response - Heavy snow or FZRA
When conditions are suspect or HOT near limits
Mod/hvy precip or blast from other aircraft (a lot variables)
If precip continues
Invalid response - Heavy precip
Heavy precip/rain Z
Lines of HOT, heavy precip , contaminants
Yes - always - If precip. is falling
When conditions dictate i.e. ice on wipers pr other prevalent areas are seen from cockpit
Yes - always - At least from cockpit
If I suspect further contamination is taking place at the wings
In precip
Heavy precip
When I feel precip. conditions have changed significantly or when close to HOT
Changing conditions
Heavy snow or precip
Other A/C/ or wind blowing snow from adjacent taxiways
PAX or flt attendant concern
Freezing rain or heavy snow. Depending on temp.
Subject to external weather conditions
Close to HOT
When in doubt
Heavy snow/freezing rain
Invalid response - Heavy snow
X-wind with heavy snow/other A/C blowing snow at VS.
Heavy snow
If heavy precip
Invalid response - If it is close or begins snowing heavier than the time deicing was commenced
When conditions warrant
Depends on airport/ground crew experience
If precip gets heavy
In bad conditions
Freezing rain, heavy snow
Depend precip & time
1/2 - 2/3 HOT expired
Precip
Precip
Heavy precip
Invalid response - 1
During snowfall etc.
Yes - always - Should be mandatory
If significant precip has fallen...regardless of HOT
Heavy snow/freezing rain close to HOT elapsed time
It depends on weather
Depending on the amount of precipitation falling
Long taxi-heavy precip
Where wing surface condition is in doubt
When uncertain during mod/heavy precip
If possible
Increased precipitation falling
If precip is falling
In precipitation approaching HOT expiry
Certain snow ice conditions
Precipitation
Excess holdover time
I can partially see wing from cockpit, heavy precipitation
Precipitation rate, time to T/O
During moderate or heavy precipitation
Long delay with precipitation falling
Windy or other aircraft exhaust
When precipitation is falling unless taxi times are less than HOT by a wide margin
Heavy snow/freezing precipitation
Time versus precipitation type/level
Precipitation (snow, freezing rain)
Heavy snow or freezing rain
When in doubt
Depends on fluid type used & precipitation
If you suspect contamination perhaps type and intensity of precipitation have changed
Any concern for contamination of fluid failure
Invalid response - Thats how it is
HOT exceeded e.g.. company SOP
In heavy precipitation
Precipitation falling
Aircraft blowing snow during ramp turning maneuvers
If precipitation is evident
Heavy precipitation/blowing condition etc.
Moderate/heavy snow & freezing precipitation
Snow conditions/freezing precipitation
Depends on precipitation
*** precipitation & timelines exceeded
All we can see are leading edges
If snowing or there is visible precipitation causing contamination
Adverse weather
Depending on wind, temperature and icing conditions
During heavy precip.

D2. In conditions conducive to ground icing, but the aircraft was NOT deiced, do you routinely make a visual pre-take-off inspection just prior to take-off?



[Note - 6% of pilots did not answer]

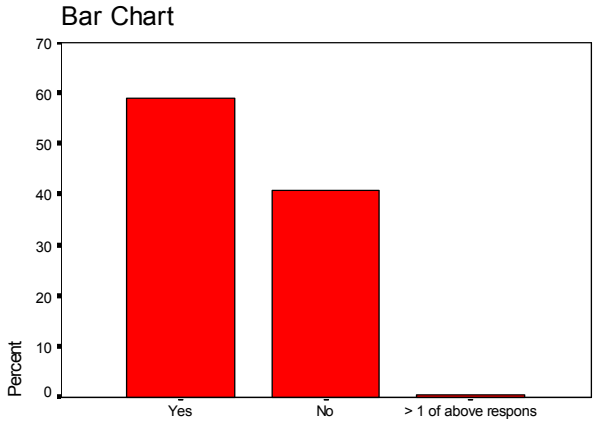
If Yes - in certain conditions, please specify:

Snowfall visual taxi time - is it first flt of day or a 30 minute turnaround
If I have reason to believe there is contamination
Snow sticking to windshield
Yes - always - i.e. at the ramp before start
Snowfall (visibility) taxi time, is it 1st flt of day or a 30 minutes turnaround
If possible wing contamination
Precipitation during taxi-out if there is any doubt
Yes - always - It is unlikely that if conditions are conducive to ground icing I would not have gotten a spray
Rep. surface questionable
Short turnaround time - cold fuel
See D1
Clear ice caused by cold fuel tanks
Anytime contamination is expected or upon notification by flight attendants or even passengers
Sticky snow (warm Temperature)
Yes - always - Even at 8 or 9 Celsius some icing under wings tanks
Snow squalls, low blowing snow
No - rarely or never - N/A, ground icing, I always deice
Low vis- ** frost
If precip. is heavy or wet
Watch other aircraft around us
No - rarely or never - So far company procedures/policy application has prevented this situation from happening
Yes - always - On representative surface
Would not leave ramp in these conditions without inspection then if conditions deteriorated I would check wings just before T/O
No - rarely or never - Because I would deice first
Depending on conditions/weather temp/A/C temp.
Depends on conditions
Any indication of ice on nose or wind screen area
Invalid response - Never really had this, always deiced
Freezing over tanks even if cause due to cold soaked wings
Precipitation after leaving gate
If icing suspected! Normally aircraft would deiced or anti-iced
In conditions of possibly clear ice formation
Inspection at gate, very short taxi
Before leaving the ramp
Light snow, light rain I O
Temp. precip. drifting snow etc.
Would get A/C deiced period!
Just prior to closing the door I go out and touch the wing to check for ice
Invalid response - Would not go without deicing
Snow (wet)
Again precip. is gray element
Visible precipitation
No ground crew check of wing
Dependent upon fuel temp. and wall - around observations
If I have any doubt
If I suspect icing
unless ground person has checked wings
Heavy precip
When in doubt
Conditions may be changing
Light or + precip
If in doubt
Out cockpit window but visual is poor
No - rarely or never - Ground crew
Reduced vis, sub temperatures
If ice suspect
In precip
Maintenance not able to
Cold soaked & cull fuel tanks
Near freezing temp & precip starts while taxiing for T/O
OAT-10C & below with snow falling
If I suspect contaminated wings
Temp near freezing, wet snow, light freezing drizzle
Invalid response - We don't do this
Precipitating
Significant precip
Yes - always - Take-off is not conducted
Only situation experienced to qualify is cold wing and dry snow, in this case I would do a PTI if there was any doubt as to clean wing
Invalid response - Yes judgment call

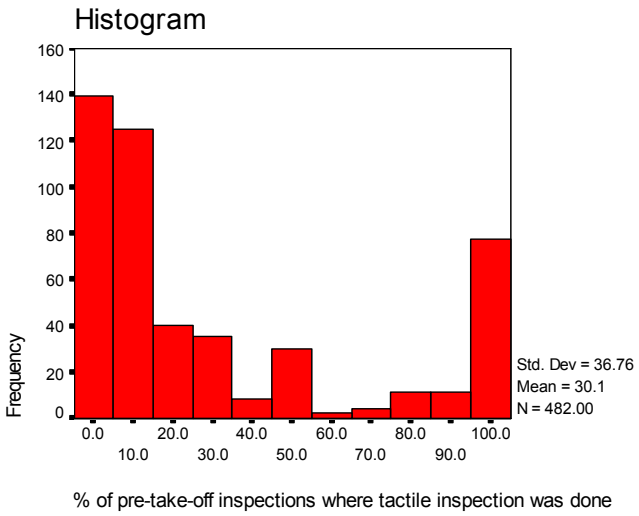
1. if inspection wasn't done at the gate 2. if I have any doubt, I will inspect
Wing inspection + spoiler inspection prior to T/O
Not in snow grains ore very cold where snow bounces off
Snow or obviously frosty days
If conditions indicate possibility of ice
Precipitation while taxiing
I make a visual inspection whenever I feel it is warranted but always if the HOT is passed. If the wing is contaminated I get it respray
Intuitively
No - rarely or never - We always deice
Visible moisture, etc.
If freezing precip starts after leaving ramp
If ice noted to be forming
Invalid response - Rep. surface inspection
Yes - always - Temp. dew point etc.
If precip is falling
Invalid response - This situation has not occurred to me
If precip is suspected of adhering
Always inspect perhaps the precip. has stopped
When I suspect icing could be starting if I see other clues
Weather conditions, cold soak A/C, etc. quick turnaround with the walk-around A/C prior to eng. start to assess
Where A/C came from
Weather conditions change i.e. snow not blowing off
If I have reason to think there may be contamination
Yes - always - Of course
May be done by maintenance
Invalid response - N/A, A/C always deiced
Suspect icing could occur
Invalid response - In conditions conducive to ground icing we deice the aircraft. If it starts after push back redo the P.T.I.
Change of WEATHER conditions after pushback
When precip present
Increased rate of precip
If conditions warrant-visible moisture, dew point/temp. spread
In precip
Unexpected freezing precip
Depending on rate of Precip
Whenever there is [precip. on fuselage
When required
Yes - always - We just do not T/O without deicing
Fuel temp. & type of precip
No - rarely or never - I get deiced in icing condition
Heavy to moderate snow and OAT -10C
Invalid response - No T/O until aircraft anti-ice
Rapidly deteriorating conditions
Invalid response - We deice in these conditions
High humidity, cool temps.
The time spent on ground since I checked the wings at the gate
If snowing
Yes - always - We deice
Only when you think necessary
If there is any chance of accumulation
No - rarely or never - Visual inspection before leaving gate
High humidity, cold fuel in wings
Invalid response - Would not be taxiing for T/O if wing net condition could produce wing contamination of any kind
Weather has changed and we have people outside who can inspect it
Change in conditions
If conditions warrant
If precip is significant
In precip with temp at or below freezing
Invalid response - I do not fly in conditions conducive to ground icing without being deiced
Invalid response - Worsening conditions on taxi out
Long taxi + freezing precip
If there is enough cold fuel (05.-15C) to reach upper surface to create frost there
Invalid response - Don't do it
Visible precipitation
Invalid response - Why would we be taking off without being deiced
Large amount of fuel boarded during station stop - light drizzle temp. -10C
Yes - always - 5
Same as above
Invalid response - This situation has not arisen
Depends on time elapsed since preflight inspection
If conditions have worsened since start/taxi (before which I had a clean aircraft)
WEATHER conditions change, in long line up e.g. Toronto 30 minutes
If temp below -10C wing is clean at ramp, then during taxi for T/O the jet exhaust from preceding A/C may warm wing
As in D1
Invalid response - I get the plane deiced when there is ice on the plane. I do not get it deiced if there is no ice on it, period
Yes - always - In my opinion if icing conditions exist the A/C is deiced
Yes - always - I make inspections at gate prior to pushback
Invalid response - Always devices in these conditions
Invalid response - N/A
Depends how dry snow is
If the A/C did not need deicing after a walk around it should not require a pre-take-off insp. unless those conditions changed or a delay
If precip appears to have increased or other factors changed
If any doubt exists inspect
Invalid response - In these conditions I always deice
No - rarely or never - If I was unsure I would have deiced
OAT less than 15 C and dew point within 3 C, and main fuel tanks are near full or// OAT <15 C and visible moisture present and near ful
Cold fuel, humid conditions low above freezing temperatures
No - rarely or never - If we haven't deiced, it's because we know there is no icing
Invalid response - I usually deice in these conditions
Invalid response - We always deice in conditions conducive to ground icing
During precipitation

In moderate precipitation conditions
Invalid response - If there is ground icing, we deice on anti-ice
If I feel its necessary
In moderate heavy snow, freezing rain or wet snow
Time permitting
see D1
No - rarely or never - Note: aircraft are always deiced in conditions conducive to ground icing
If conditions have changed since departure ramp, after walk around inspection
ZR\ZD heavy snow
If there's an indication that there could be icing
No - rarely or never - We deice in those conditions (+anti-ice
Precipitation
If precipitation starts falling during taxi
Yes - always - Bad question - the A/C would have been deiced
If I suspect in any way its sticking to the wings
Precipitation increases
If ground icing cond. prevail then A/C would have been de/anti-iced
On boarding A/C
If precipitation and temperature present to cause adhering to surface
In accordance with conditions & experience
When warranted based on my experience/8 existing conditions
Type of precipitation/wind conditions
No - rarely or never - I do not taxi from gate without deicing in conditions conducive to ground icing
No - rarely or never - A/C are always deiced if there is any doubt
Snow conditions/freezing precipitation
If precipitation begins after taxiing out for departure
Depends on ground cover & precipitation
Any changes in rate or intensity of precipitation since gate departure
When in doubt
Invalid response - Bogus question - if ice is there I deice
Before start & representative surfaces before take off
If ground crew has blown onto wings and/or engines
Cold fuel/temp close to freezing
Depending on wind, temperature and icing conditions
Temp above -20C + heavy precip.

D3. As part of the pre-take-off inspection, do you ever have a tactile inspection of the critical surfaces done by personnel outside the aircraft?

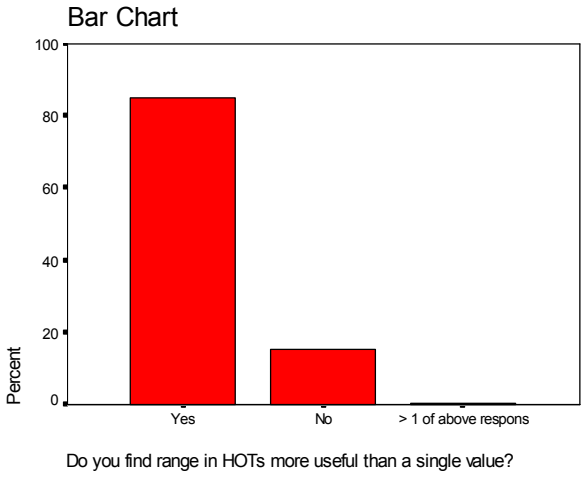


If yes, give approximate % of pre-take-off inspections where tactile inspection was done:



% of pre-take-off inspections where tactile inspection was done	
Twin Turboprop High Wing	24.33%
Twin Turboprop Low Wing	18.08%
Twin Turbofan - Max 70 pax	23.04%
Twin Turbofan - Max 150 pax	31.44%
Twin Turbofan - Over 150 pax	35.09%
Three Turbofans	28.62%
Four Turbofans High Wing	23.71%
Four Turbofans Low Wing	41.28%
> 1 of above responses	46.67%
Total	30.15%

D4. The holdover time tables give a range of holdover times for a specific weather condition. Do you find a <u>range</u> more useful than a single value?



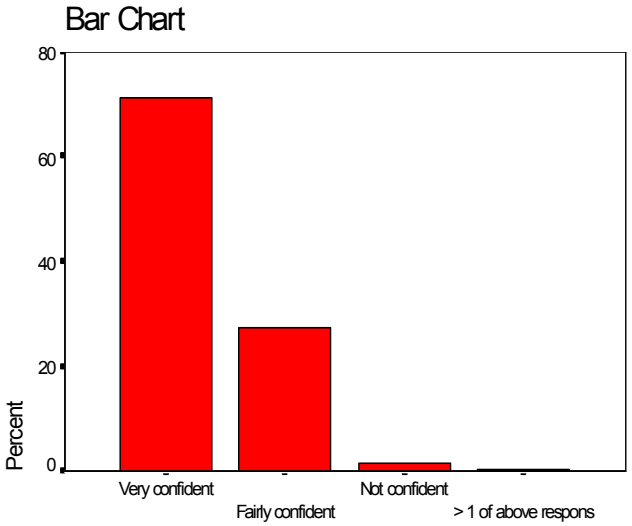
Comments:

Yes - Very good but must be watched carefully
Yes - Allows for pilot judgment
Yes - Allows some flexibility
Yes - Versatility
Yes - Of course!
Yes - Very good but must be watched carefully
No - Our company uses most conservative of ranges so it would probably be more restrictive
Yes - It provides flexibility
Yes - Allows for some judgment on part of crew. For me this is good. However experience of crew at assessing conditions become a factor
Yes - Allows greater flexibility
Yes - I can be a good judge of the severity of precip. on collecting on A/C . Although I find my education on fluid failure to be lacking
No - I have to use the min. HOT. The max. HOT is not practical info.
No - A range adds unnecessary confusion and interpretation by individuals reluctant to perform a HOT inspection
No - The number is a limit before inspection req. A reasonable standard. Except we need a better way to inspect
Yes - Let's leave some room for experience and common sense
Yes - Gives captain more discretion
No - The A/C I am captain on uses the most restrictive holdover times
Yes - WEATHER is a continuum, not discrete
Yes - Range gives you a window to work with, in time, a will a visual inspection
No - Use only shortest HOT on table
Yes - You have to make your own judgment on severity of conditions to apply the time tables
No - A conservative single value would be helpful
Yes - Makes us more aware as pilots
Yes - Allows discretionary revisions to be made by pilot
Yes - Variable conditions existing
Yes - Mother nature many variables
No - Too interpretive
Yes - 1
Yes - More information
Yes - Again, different conditions mean different judgment calls. I will not let overzealous government bureaucrats who do not have any
No - Our company HOT tables give a single value for each specific conditions
Yes - HOTs are not accurate, they are estimates
Yes - Leaves us with some latitude to exercise judgment
Yes - Gives more flexibility, but if used improperly can increase risk
No - Would be better if the table was more specific
Yes - Ranges cover more situations
Yes - I don't think it's possible to come up with a single value
Yes - Because conditions are never the same
Yes - Conditions vary with each occurrence
Yes - Precip. intensity must be evaluated by each pilot
Yes - Since a single value will be by default most restrictive a range would have effect of extending HOT if weather conditions. were more favorable
No - I just use the shaded sections
No - What do the upper and lower values mean
Yes - Weather conditions never fit a single value. It's nice to have a range of choices
Yes - A range is good because conditions may not be as stated on the chart. Some interpretation could be necessary
No - Still do visual inspection
Yes - The 1/3 system seems to be of help
Yes - Not sure of question
No - Want min HOT only
Yes - Too many variables for a fixed #
No - I am sure there is sufficient data to keep it simple & give us a single value

Yes - It allows individual experience to play a . A single value would not be realistic. Would likely shut down Ops, might be a good thing
No - Would prefer only most conservative value
Yes - Best option for crew single value could be construed to mean: You're OK do not check
No - To subjective
Yes - Training on fluid failure would enhance the reliability of holdover times
No - Adds confusion whether it is still effective
Yes - Rate of precip is not that definitive
Yes - Weather conditions operate within a range as well
Yes - This is not an exact science. Each situation must be assessed individually as conditions will always vary.
No - Everyone uses the longer time anyway
Yes - Conditions vary
Invalid response - Just a guide, look and live
Yes - Allows for varying conditions
Yes - There are too many variables to be generic
Yes - A range is much more realistic for icing conditions
Yes - Allows for variables
Yes - The range combined with type/intensity of precip. OAT & other factors helps make decision on HOT
Yes - More specific to conditions
Yes - No 2 days are alike
Yes - Ice not an exact science. Conditions rarely textbook. Range is very useful
Yes - Again common sense, this allows for judgment
No - Always use minimal values
No - We use a single value
No - Our official holdover guides don't give a range. All you need is a maximum time
Yes - Hard rules are operationally impractical
Yes - Can vary depending on the weather conditions. A range would be more representative for the actual conditions
Yes - Allows flexibility to suit conditions
Invalid response - Depends, you cannot regulate professionalism & experience
No - A range is ambiguous
Yes - It remains the pilot's judgment & decision whether or not the wing is clean or not. HOT should be a guide only
Yes - Too many variables to consider to have a single value
Yes - The intensity of precip. varies substantially and if unsure the HOT conservative
Yes - Sometimes it's difficult to specify the exact weather conditions - a range is more appropriate
Yes - Assessment of rep. surface under certain conditions will be used within a range of HOT values
Yes - Allows for assessment of varying conditions
Yes - If attempts to accommodate varies factors to make HOT estimates more accurate seems to be more useful & forces me to consider other factor
Yes - Weather conditions vary, therefore range is useful, single value are not subjective enough. (Costly & time consuming)
Yes - Gives greater flexibility
Yes - Each weather condition different
No - Then people would tend to use the longest time
Yes - Conditions can vary
No - I want a hard time
Yes - Can use min/max. times depending on type of precip & rate
Yes - Range is more pragmatic
Yes - If the lower limit had been reached I would make a visual assessment from the cabin
Yes - More flexibility for various conditions
Yes - Accounts for variables
Yes - Because other factors always come into play
Yes - This is not an exact science
Yes - For guidance only, not for enforcement
Yes - A range is more useful with the worst case scenario factors (i.e. HOT) the ones being used
No - It should be one value my opinion of a type of precip. may be different than yours
No - Too much confusion
Invalid response - There should be no delay for T/O after deicing
No - Still prefer visual confirmation prior to T/O
Yes - Allows for more flexibility to determine HOT in a wider variety of conditions
Yes - Give a better idea of HOT when precip changes during taxi
Yes - Because intensity varies
Yes - It would be impossible to not have a range. Conditions are too variable
Yes - Depends on actual conditions
Yes - Personal interpretation of conditions have a range
Yes - It gives some latitude for variable conditions
Invalid response - Never had a single value
No - Always weather most conservative time
Yes - Very accurate and yet conservative guidelines
No - Prefer a single value for each condition if it's exceed, visual inspection necessary
Yes - Gives flexibility to the pilot
Yes - Allows me to exercise discretion
Yes - No one condition is the same
No - Most pilots tend to use the high end of the range as a maximum
Yes - The table is only a guide
No - A reasonable (safe) maximum holdover time is simpler
Yes - They have to be approved for Type 1 fluids by Transport Canada
Yes - Greater confidence with HOT
Yes - They allow some intelligent discretionary input into a decision
Yes - Deicing seems to be an art more than a science; some flexibility seems prudent
Yes - Huge difference between "dry" small snowflake and big wet ones
No - I still check
Yes - Times vary as conditions vary
Yes - Tables are "general" guidelines, I use them conservatively
Yes - Not all conditions are within a range area the same

Yes - More useful & accurate. Spraying needlessly is expensive & harmful to the environment
Yes - Too many variables to make a specific time
No - Confusing, misleading
No - Single value means more to me in determining possible fluid failure since I realize that failure under certain circumstances may occur
Invalid response - Guide only
Yes - More realistic
No - All I care about is how long the fluid is guaranteed to be effective(the minimum time only)
No - Every situation is different, you can't generalize
Yes - Allows your discretion for actual weather conditions
Yes - Condition change
Yes - It allows the crew to use common sense to assess situation
Yes - All conditions have variables
No - Too much open for interpretation
No - A definite number given worse case is best
Yes - Most holdover times are too restrictive. ATC delays often mean that holdover times are compromised
No - Strictly guidelines only see B5
Yes - Allows for variable conditions
No - There are too many conditions that contribute to ground icing aid a single number makes for a more decisive point on holdover times
Yes - Everything is merely best guess anyway
Yes - Conditions very, so should the times
Yes - Allows for a wider range of icing rates and deicing efficiency
No - With the urge to depart the maximum value of the "range" is normally used
Yes - Various icing conditions can exist on an airfield & during the period in question
Yes - A single value is too limiting , a range accounts for outside factors
Yes - Single values would require all atmospheric variables
Yes - Weather conditions are never the same, and a range allows for subjective opinion based on current conditions
Yes - A single value would have to be averaged over a range of conditions anyway. Nearly meaningless
Yes - Difficult to chart
Yes - Conditions always vary
Yes - Variable precipitation rate, judgment
Yes - The range must be interpreted in the direction of safety, not convenience
Yes - Alerts a pilot as to when to become alert
Yes - Yes due to varying precipitation conditions
Yes - Gives room for human input i.e.: heavy snow at terminal then light snow while taxing out
No - Our tables give a conservative 'hard' time - no range
Yes - Too many variables involved to establish single value
No - I always use the shortest time in the range
Yes - Helps with decision making
Yes - Again, ground time versus precipitation type/level
No - Nothing is that accurate
Yes - Excellent table
No - Single value more apt to be used
Yes - Even though you have to take the lowest value as the time where failure is expected to occur (most conservative approach)
Yes - Allows application of judgment, airmanship
No - Make it more vague instead of cut & dry
Yes - Conditions are never constant
No - Absolute value more useful
Yes - Variable WEATHER conditions
No - Single value eliminates a decision if time falls into range
No - Max value all that is required
Yes - A range does make more sense as conditions vary
Yes - Intelligent application
Yes - Gives (Accuracy) - defines limits to various conditions. ie. light snow vs heavy snow at various temperatures etc.
No - To be safe (cover your ass) you use the more restrictive of the times anyway
No - We only use the lowest value of range
Yes - Flexibility
Yes - Conditions vary greatly - so should values
Yes - Realize that the guidelines allow a measure of confidence to support cockpit observation. I can do a P.T.I. anytime regardless of HOT
Yes - Depends on amount of precipitation
Yes - I can assess whether or not certain variables are to be considered in the range
Invalid response - Irrelevant
Yes - More accurate. Better operational friendly
Yes - It emphasizes a possible range as opposed to a specific time (i.e. holdover could be as long as if 12 min or as short as 6 min it forces
Yes - Is more realistic and supports pilot decisions in a more helpful way
Yes - Variety of conditions
No - Either is fine - they are just guidelines
Yes - Depends on intensity of precipitation therefore each time period maybe different
Yes - You have to understand concept
Yes - Too many variables
Yes - Aim to be airborne by 1st time. The closer I am to the max. time the more careful a last minute inspection I carry out & more likely return
Yes - Weather conditions are not as general as table labels indicate
Yes - Actual holdover time (fluid failure) varies with precipitation intensity
No - If there is doubt, you check wing anyway

D5. How confident are you that the aircraft is clean when cleared by the deicer crew?



How confident aircraft is clean when cleared by the deicier crew?

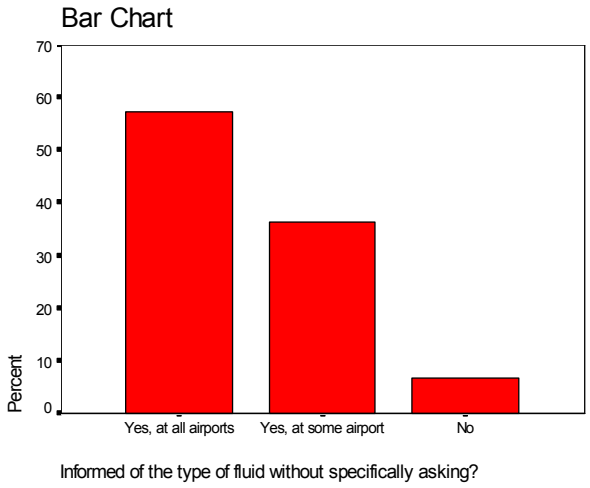
Comments:

Very - Always very competent and professional
Very - Lately I'm involved with very professional crews
Fairly - Requires monitoring as some mistakes have occurred
Very - Always very competent and professional
Very - Ground crew and procedures are effective.
Very - My airline is conservative in it's approach to deicing so there is always more spray used than less & no $ saved at safety's expense
Very - In Canada
Very - I find the deice crews are very well trained
Fairly - At Cdn stations, am very confident. Not so at US airports
Very - Our deicing crews are conservative in favour of clean aircraft
Fairly - Some crews understand what they are doing. Some just apply fluid
Not confident - I don't trust deice crews. There as been to many incidents where A/C hasn't been clean
Very - When wrong company staff
Fairly - We don't do ourselves. There's always a bit of doubt, that's why we visual inspect as well
Not confident - Many times had to have re-deiced because surface not completely cleaned
Fairly - Depends on trucks & station
Fairly - Procedure knowledge of contract personnel. sometimes suspect. Last minute deicing at gate means almost impossible to check procedures
Very - Once you have their attention they are usually pretty good
Very - Large airline operation is good
Fairly - Depends on specific airport
Fairly - Of ice crew under pressure to complete spraying large numbers of aircraft under difficult conditions
Very - Professionally trained (experienced). Most important visual inspection of surfaces are done properly by cheery pickers etc.
Very - Well trained ground crews
Fairly - Depends on experience at that particular station
Very - They seemed well trained and they don't spare the fluid when deicing
Very - I trust no one so I check myself
Very - Some concern with non-company personnel at out stations
Very - Our crews are very well trained and dedicated to that task alone
Very - Trained professionals
Fairly - Depends on location
Very - We normally spray more than what is needed
Very - Ground crews have been very diligent about this
Very - We have good people on the job
Very - Overkill is their motto
Fairly - Very confident at some airports
Fairly - When made by our own people
Very - That's their job and they are the closest to the surface
Very - Because they have a professional attitude and they want a flight to be as safe as possible
Fairly - Have to be a believer
Fairly - Still aware of previous buildup compared to litres applied in case one felt it may have not been applied properly
Fairly - Depending on application time
Very - Trained crew +length of procedure
Very - None
Fairly - Our own crews are well trained. Our contract crews are not
Very - Responsible ground crews with good training
Fairly - I am PIC sometimes I don't trust anyone
Very - Often overdone
Very - Part of the crew
Very - They are well trained and I check their work
Fairly - More confident at larger airports than smaller airports
Very - My airline has well trained deice crews
Fairly - Not so confident in the US (contract crew training may be suspect)
Fairly - Backed up with a visual check by flt crew
Very - Well trained and competent
Very - Their annual recurrent training is as rigid as ours
Fairly - Depends on icing conditions and what out station you are at
Fairly - They need more training
Fairly - Rampies are not that careful
Very - Company very conservative lots of training. Usually aircraft receives a spray amount much greater than required
Fairly - Not always sure if they check surfaces are clean when spray is completed. I have heard of an A/C taking off in winter 97 and ice on
Fairly - Previous experience with same crew

Very - I better because I can't do it myself
Very - Depends why deiced - Sometimes better not to
Very - I trust them as professionals just as I would & do trust our maintenance people
Fairly - There have been occasions when it has not been done properly
Fairly - Depends on severity of conditions & length of de/anti-ice
Fairly - Small out stations don't get the same hands on experience that you get at larger bases that have specified deice crews(not Jack-o-a-t
Fairly - Depends on which base we deice at
Fairly - Only at larger airports
Fairly - If they are trained by established airlines I tend to be quite confident in them
Very - Except for some places in the US
Invalid response - Depending on airport
Very - Well trained. ground crew
Very - George Morwood made a mistake (fatal) & the mot has turned into a monster!
Very - We have good equip & ground support
Very - Professionally trained personnel
Very - Never had a problem, ground training of crews works
Very - Once on 727 crew did not deice top of fuselage & another A/C informed us during taxi from deice bay
Fairly - I was very confident until one our aircraft lost an engine due to the ice at the wing root
Fairly - Depends on who crew work for
Fairly - Ground crew training may differ from station to station
Very - Only one aspect of many in flt operations built on trust between professionals
Fairly - Less at out-stations
Very - I have heard others who are not so
Fairly - Used to be very confident until incident happened where A/C confirmed clean & on T/O roll snow from top of fuselage went into engine
Very - They're professionals and they have a better look at the wing than we have
Very - Probably better than us. They see front a better angle, they can do a tactile
Very - My company has good deicing crew training
Very - Seemed to be trained to a high standard even at the smaller A/P's
Very - Our crews are well trained
Very - I am not always confident about % of Glycol deicing
Very - Copious amounts of fluid used on our aircraft
Fairly - We are all dealing with humans - human error is possible
Fairly - As long as mechanical sweeping/blowing is done where appropriate and not fluid where not appropriate
Fairly - Any procedure is subject to human factors
Fairly - Some places more than others
Fairly - We rely on deicer crew 100% for tail, we can only inspect the wing
Very - Well trained personnel & excellent equip.
Very - Only one incident in 11 years as Captain where wing was still contaminated
Very - S.O.P.'s are very thorough in our airline
Very - Inspection by ground personnel done
Very - If at a company base
Very - I check it myself or the F/O does
Fairly - Some bases more so than others
Fairly - Some equipment is poor
Fairly - Some US stations poor knowledge & experience (Icing crews)
Very - You have to trust someone
Fairly - Until I check it
Very - Yes. They are trained
Very - Especially when carried out by company personnel
Very - Particularly by company personnel
Very - Good training by our ground crews is evident
Very - Improved greatly over past 2 years
Fairly - I have been caught a few times with a poor deice spray
Fairly - They've been known to make mistakes
Very - But only with company crews in Canada
Fairly - Under most conditions I'm very confident; if the A/C is covered with a layer of clear ice due to freezing rain, I'm not that confident
Very - Only at certain locations
Very - Canadian Airlines system and training is excellent
Very - Time each application procedure and check litres
Fairly - Ground crew should alert crew of to what parts of aircraft have been deiced
Very - If I am able to observe the entire process
Very - When done by Air Canada personal only
Very - Only sure have I had occasion to question the lead
Fairly - Depends on airport
Very - Have observed many deicings of other aircraft
Very - I have no choice, there are parts of the A/C I cannot see (fuselage, tail)
Very - Otherwise I inspect personally
Very - Training key - professionalism
Fairly - Every once in a while they will miss a bit and I have to tell them to redo a spot
Fairly - Experience from previous deicing at particular station dictates my confidence
Invalid response - Very confident if deiced at a deice center i.e.: YYZ, YUL,YVR,YWG Not confident if station does not have a deicing center
Very - Confidence high at 95% - require further or total re-spray
Very - At major airports
Very - Ask flight attendants
Fairly - Not 100% by any means. Would be more concerned if flying a rear engined jet aircraft
Very - Only one case in 18 years when aircraft was not clean when cleared by deicing crew
Very - Never had a problem, they are properly trained
Very - Our airline has had proper procedures
Fairly - I have too watch the contract workers closely. Some do not have a complete understanding
Very - They are professionals where I work
Not confident - Certainly not at Air Canada stations
Very - At non-scheduled airports I'd be less confident
Fairly - We've had one accident due to this
Very - Super clean
Very - Except in USA

Fairly - Can never fully trust anyone else's judgment though
Fairly - Some stations are better than others some deicing OPS done away from the ramp in poor lighting
Fairly - Some errors have occurred but are rare. When I'm in doubt I brief crews on procedure
Very - Very confident based on known operator
Very - Providing I have spoken directly with deice crew
Very - Except for certain outstations
Very - In cockpit its like driving through a car
Very - All our deicer are experienced and well trained
Very - In Canada
Very - Good training of deicing crew meets standards set - by company
Fairly - I was once advised by a crew that only one wing had been deiced as the truck had run out of fluid and would take some time to be refill
Fairly - Depends who does it
Very - Ground crews are generally dedicated!
Fairly - >95% but <90%
Very - Crews are well experienced
Fairly - Still requires a look
Not confident - Maintenance do not oversee anymore ground crew are too transient
Very - Airline uses their own men (trained)
Very - Less confident at contracted bases
Very - Air Canada has well trained crew off line I am more conscientious
Very - They have far more experience with airframe icing than flight crew and are much closer to aircraft surface
Very - High standard to which crews are trained
Very - At most stations
Not confident- Usually miss the fuselage in front of #2 rwy
Fairly - Depends which station
Fairly - We have one known case where substantial clean ice (up to 1/2") was on top of wing

D6. At each airport, are you informed of the type of fluid in use for deicing and anti-icing without specifically asking?



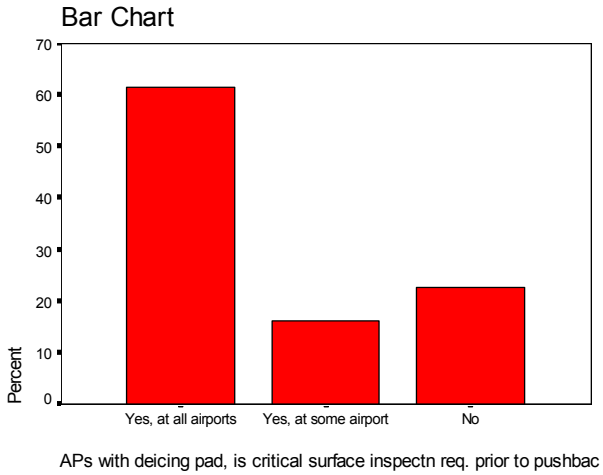
Comments:

Yes at all airports - It is part of the standard RT
Yes at all airports - Company policy
Yes at some airports - USA don't conform to HOT standards
Yes at some airports - SOP calls for this, but sometimes I have to ask
Yes at all airports - Always
Yes at all airports - It is part of the standard route
Yes at all airports - We are told: type, concentration and start holdover time.
Yes at all airports - This our Co. procedure. Occasionally in the US they will not and we will ask
Yes at all airports - Sometimes must ask
Invalid response - I usually ask before informed
Yes at some airports - Usually have to ask
Yes at some airports - Our company crews are consistent however other companies vary
Yes at all airports - Smaller airports only have one type
Invalid response - This varies from spray crew to crew at same airport
Yes at some airports - At non-company stations, I always ask
Yes at all airports - Company policy
Yes at some airports - At larger ones
Yes at all airports - Company policy
Yes at some airports - At large airports (YWG best)
Yes at all airports - It is the law
Yes at some airports - Sometimes you have to ask. Central deicing sites have best procedures, knowledgeable personnel
No - Although they are supposed to
Yes at some airports - Ground crew usually forgets to inform
Yes at all airports - Part of my airline crew training
Yes at all airports - SOP
Yes at all airports - Not always by ground crew, but by company publications. i.e. only Type 1 available
Yes at all airports - Company policy
No - Sometimes we have to ask
Yes at some airports - See above comment
Yes at some airports - Should always give - should be mandatory
Yes at all airports - Time & type
Yes at some airports - Crews have to be prompted to report fluid type
Yes at some airports - Some small airports only use one type
Yes at some airports - Only 1 airport that I fly out does
Yes at some airports - Yes at most airports but once in a while I have to ask
Yes at some airports - Have to ask sometimes
Yes at some airports - Sometimes we have to ask
Yes at all airports - Part of our S.O.P.'s
Yes at some airports - Not all/Some have only Type 1
Yes at some airports - Often it is assumed Type 1 if no precip

Yes at some airports - Ground crews are not consistent in their deicing verbal calls
Yes at all airports - Outside Canada one often has to ask
Yes at all airports - Company policy
Yes at some airports - Difficult to get proper info in USA
Yes at all airports - Yes at most airports - Poor answer choice
Yes at all airports - Company has very detailed procedures
Yes at all airports - Co. procedure requires this
Yes at some airports - Some ground crews are better than others
Yes at all airports - Company policy to inform flight crew of the spray type, concentration. & applic. start time
Yes at some airports - Have to ask most of the time (80%)
Yes at some airports - If not, we ask
Yes at some airports - Should be at all airports
Yes at all airports - All our ground staff conform to some standard
Yes at some airports - Not always
Yes at some airports - Canada + US are not together on this
Yes at some airports - Most Canadian operations
Yes at some airports - Not consistent
Yes at all airports - See above
Yes at all airports - 99% of the time
Yes at some airports - If asked they provide info/most tell you without prompting
Yes at all airports - It's the procedure
Yes at all airports - Yes in Canada, no in USA
Yes at some airports - Yes at Canadian airports/at USA airports I find we have to ask
Yes at some airports - Have to ask on occasion but this rare
Yes at some airports - Reason unknown
Yes at some airports - Have to request info at smaller airports
Yes at all airports - Comp-procedures
Yes at all airports - Certainly in Canada
Yes at some airports - It varies at some airports
Yes at some airports - Small airports to date only have Type 1
Yes at some airports - Improving every winter
No - Only at larger centers
No - Frequently must ask
Yes at all airports - Our procedure
Yes at some airports - I am not, I ask them to specify
Yes at all airports - Few exceptions
Yes at all airports - Ground crew inform flt crew
Yes at all airports - Our Co. issues each Captain a memo which we keep with us
Yes at some airports - Had to ask got the correct response
Yes at some airports - Worse in USA
Yes at some airports - Info has improved greatly
Yes at all airports - Standard Co. procedure
Yes at some airports - Yes at most A/P (SOP's) Periodically deice crews forget to tell us & must be prompted
Yes at some airports - Mostly
Yes at all airports - Our crews have been trained well
Yes at all airports - Standard company procedure
Yes at all airports - Part of S.O.P.
Yes at some airports - Always know prior to taxi
No - You must ask at most smaller airports
No - Must ask almost everywhere
Yes at some airports - Not always informed till we ask
Yes at some airports - This has been a concern at some of the A/P's that deice less frequently during the winter
Yes at some airports - Most important
Yes at some airports - At all domestic airports
Yes at some airports - 90% of the times we are told
Yes at all airports - When we ask
Yes at some airports - Sometimes you have to ask
Yes at some airports - Communications is the key
No - Only informed 25% of fluid type & time - rest of time we must ask
Yes at all airports - Company policy requires this of ground crew
Yes at all airports - S.O.P.'s (Company)
Yes at some airports - 90+%
Yes at all airports - Co-policy & SOP
Yes at some airports - 2
No - I have noticed the wrong fluid being applied to a large commercial aircraft in YVR
Yes at some airports - Not in the Artic
Yes at some airports - At company main base - otherwise must ask, in USA must ask
Yes at some airports - Company deicing
Yes at some airports - Given when asked
Yes at some airports - In our OPS we should be told by crew each time
Yes at some airports - Larger operations always tell us
No - Not at most airports
Yes at some airports - Yes, at most airports
Yes at all airports - Although at most airports only Type I is available
Yes at some airports - Always in Canada, most times outside Canada
Yes at some airports - Yes, at most airports
Yes at all airports - In Canada / not so in USA
Yes at some airports - Routinely request Type, temp. and amount
Yes at all airports - Company procedures mandate. Fluid type and time reports
Yes at some airports - To be fair I should say it is done 90% of the time
Yes at some airports - This should be mandatory by ground crew
Yes at some airports - Improved
Yes at all airports - Would not go if not given this info
No - All the same in airline
Yes at some airports - At many smaller airports - its presumed
Yes at all airports - All airports where deicing is done by our company person
Yes at all airports - Except in rare cases where SOP's not followed
Yes at some airports - Operations differ
Yes at some airports - Had case where I was told Type II was being used when in fact it was Type I
Yes at some airports - Depends on the size of the airport and if radio communication is available

No - At deicing centers, we are always informed. At all other stations, we have to ask, we have to check, & occasionally find the crew...
Yes at some airports - If not advised - I ask
Yes at some airports - Some yes, some no depends on quality of training of ground personnel
Yes at some airports - Again better procedures at large airports
Yes at all airports - Not 100% of the time, but pretty close
Yes at some airports - Some airports = hardly ever
Yes at some airports - At smaller airports there is only one type of fluid available
No - Never
Yes at some airports - Yes, at most airports; depends on crew
Yes at some airports - Otherwise it is company procedure to always ask
No - Typical of Air Canada
Yes at some airports - Should be all airports
Yes at all airports - SOP's
Yes at some airports - The ground crews refer to it as 100% Type I for example; which it is not. This causes some confusion
Yes at some airports - Most airports, not all
Yes at all airports - I only depart from one airport in Canada
Yes at some airports - Could have better S.O.P. by ground crew
Yes at all airports - If we are not informed we find out
Yes at some airports - Company SOP's require it, but it doesn't always happen
Yes at some airports - At our main hub only
Yes at all airports - In Canada
Yes at all airports - Sometimes have to ask - but always get informed
Yes at all airports - With time commencing
Yes at some airports - Hudson General crews not as well trained at Calgary
No - Standardization of communications lacking
Yes at all airports - Company procs.
Yes at some airports - Some prompting required
Yes at all airports - Company policy..."type and concentration"
No - As above
Yes at some airports - Almost all large airports do
Yes at some airports - The smaller airports do not always advise fluid type or when to start the HOT
Yes at some airports - Sometimes I have to ask 50/50 is Type I
Yes at some airports - Info available at most airports without asking
Yes at some airports - Sometimes, or in memo
Yes at some airports - Not in USA cavalier attitude
Yes at some airports - Not consistent
Yes at all airports - Almost always

D7. At airports equipped with a deicing pad, does your air carrier require a critical surface inspection prior to pushback from the gate?



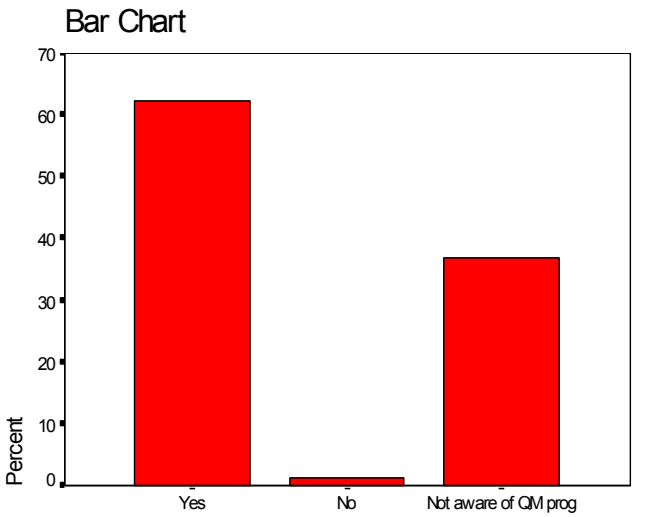
[Note - 5% of pilots did not answer question]

Comments:

Yes at all airports - Yes, it depends on precip. & if A/C was overnight or a quick turnaround
Yes at all airports - Company policy
Yes at all airports - Of course you are implying during poss. icing conditions
Yes at all airports - Yes depends on precip. and if A/C was overnight or a quick turnaround
Yes at all airports - Maintenance personnel inspect aircraft in icing conditions (or pilots if there are no maintenance).
No - Not specifically, but myself as Captain of the F/O always check
No - Inspection done by ground crew. HOT inspection done by flight crew prior to T/O
Invalid response - Don't think so, but I am confident of their overall inspection
No - We assess for ourselves
Yes at some airports - Little airport, little procedures
Yes at all airports - If requirement to deice is obvious inspection is done after deicing/anti-icing is completed
Yes at all airports - SOP
Yes at all airports - For staging
Yes at some airports - If you request it
Yes at some airports - Only where we have our air carrier's ground crew, otherwise we do the inspection ourselves
Invalid response - ?
Yes at all airports - By either the pilot or the deicing coordinator, and only when icing conditions exist
Yes at some airports - Do it myself

No - But we require a deicing clearance from the deicing coordinator
No - Not if deicing anyway
Yes at all airports - During walkaround
Invalid response - No push back
Yes at some airports - Not all stations have the req'd personnel to do these inspections
Invalid response - Don't know
No - Crews responsible
Yes at all airports - To make decision whether to deice or not
No - Only during icing conditions
No - Snow/ice seen on wing A/C is deiced
Yes at all airports - These operations must be coordinated & sequenced
No - Radio contact with deice crew
Invalid response - Don't know
No - Yes is requested or pre-checked by deice personnel
Yes at all airports - Bt ground crew
Invalid response - Not exposed to this
No - Inspection is required prior to T/O
Invalid response - Not sure
Yes at all airports - Pre-flight duty
No - Maintenance personnel inspect I do as well
Yes at all airports - Done by lead
No - None, reason unknown
Yes at some airports - Too much former CALPA interference
No - This should be mandatory
No - After deicing inspection by ground crew & flt crew prior to T/O
No - It is up to flt crew to inspect & advise of requirement for deice
Yes at all airports - This performed by ground crew in deice truck
Yes at all airports - For airports equipped with a pad
Invalid response - Pilot's responsibility and Co. Ops.
Yes at all airports - If icing conditions great
Yes at all airports - At those A/P with a pad
Yes at all airports - SOP during icing conditions or when icing may be suspected
No - Pilots are responsible to do it
No - Crew decides
Yes at all airports - We always do a critical surface inspection whenever there is the slightest chance of icing
Yes at all airports - Pilots conduct it themselves to the best of their ability
Invalid response - Yes in icing condition
Yes at some airports - All domestic
Yes at all airports - SOP
No - Pilot's discretion
Invalid response - Don't know
Yes at all airports - Company S.O.P.'s
Yes at all airports - During possible icing conditions
Yes at all airports - When icing conditions exist
No - Only during icing conditions
No - More than standard walkaround? I do not understand. If you do a tactile on upper wing then the answer is no
Yes at all airports - Qualified ramp personnel check & confirm deicing required
Yes at all airports - A complete review of deice pads procedures (YVR) needs to be reviewed. Last winter in YVR was unbelievable. Always an excuse
Yes at all airports - S.O.P.
Yes at all airports - Not the gate but where the plane was sprayed (at the pad)
No - It is the captain's responsibility, and if conditions warrant an inspection is done
Yes at all airports - If precip is falling or has fallen or frost suspected
No - It is not a requirement - but I do it anyway
Yes at all airports - In Canada / not so in USA
Yes at all airports - As airmanship "items" would never leave without doing so
No - Since the decision is already made to proceed or not to the deicing center; but should I be in disagreement I do go check
Yes at all airports - Regardless of deice pad availability we check surfaces if icing conditions exist
No - If you are going to a deicing pad, you can inspect the A/C when you leave the pad
Yes at all airports - Someone, either ground personal or pilot has to make decision to deice
Invalid response - It is part of our walkaround inspection to check the upper wing surfaces before ever flight
Yes at all airports - Naturally there is a need to inspect to determine if deicing is even necessary
No - This type of question tells me you may be way out of the loop
No - Why? If the decision has been made, by me or the ground crew lead, spraying is completed
Yes at some airports - & appropriate WEATHER condition
Invalid response - Not always, if icing is obvious deicing is done with out inspection
Yes at all airports - In Canada
Yes at all airports - By pilot & ground personnel
Invalid response - Not sure!
No - Crew normally carries out inspection during walk around
No - Not required but everyone just does it
Yes at all airports - We inspect A/C as part of acceptance
No - Not to my knowledge, the onus is on me/us

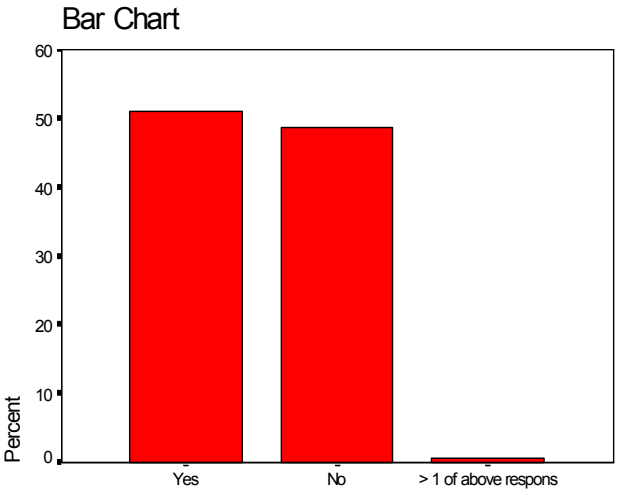
D8. Does your company have a quality management program to assess the quality or capability of deicing service provided in accordance with TC Ground Icing Operations Standard?



Comments:

Of course they assess at the end of the season to seek improvements for the next year
I assume, yes.
Of course they assess at the end of season to seek improvements for the next year
But they likely do.
Unsure
Would be a big surprise to me
Not sure but I think so
Not sure but believe they would
Not sure of the QM. There are good people in that capacity
Don't know
Don't know but expect so
Not sure
I am not informed of such
It is not organic to flt ops - line of report is conflicting with line operations
We are no. 1
I'm not sure but they probably do. They've got committees + programs for everything else
But I'm sure they have training and they follow up
Think so - depends on budget
Probably ask an office type
Don't know
Of course, we have QM program for everything! But does it mean anything?
In effect at this time
Don't know
Steady improvements year over year
This issue never taken seriously by non-pilots
Suspect they do
Are you kidding, the truck we have (YVR) cannot spray snow off within 15 minutes and we have complained about it for years
Probably
I don't know how/or if it is implemented
Don't really know
Believe so!
More unnecessary beaurocracy
If there is, they are not listening to our complaints
Probably use, but should concentrate on small contractors at small airports ie. non-union
All crew comments/complaints about deicing or anything else are handled in the same way - works OK.
I think so

D9. Given that you are within the HOT limits for light freezing drizzle, does this mean you can safely take-off in those conditions?



[Note - 8% of pilots did not answer question]

Comments:

No - You must do a P.D.I.
Invalid response - ?
No - All other factors affecting HOT must be taken into consideration
Yes - I found the tables to be very conservative.
Invalid response - What is light and what is moderate freezing drizzle
Yes - I double check with visual inspection
Yes - Given no other unusual factors
No - Not necessarily.
No - There is a wide range of freezing drizzle. Can be barely discernible to bordering ZR
No - You must do a P.D.I.

Yes - I feel comfortable with the HOT limits in most cases.
Yes - HOT guidelines are conservatives
Yes - If fluid properly applied & of type you are using The HOT for etc. from a clean wing concept, yes. Other operational factors may exist
Invalid response - Don't understand the question
No - There are many factors to consider
No - Just a guide line
No - Not necessarily. Other factors come into play. Yes under most conditions
Yes - Assuming other factors have not degraded fluid condition
No - In freezing drizzle or rain, I always inspect
Yes - I think so
No - Normally T/O would be safe if within HOT depending how cold aircraft is (cold soak-cold fuel)
Yes - Don't know?
No - Runway conditions, X-winds & numerous other factors. But the wing should be OK
Yes - As long as no other factors i.e. high wind
Yes - It would be unwise to do so without first satisfying myself visually, still
No - Need visual inspection
No - Representative surfaces may prove otherwise
Yes - Not moderate
Yes - No the reliable method to assess risk - unless conditions are abnormal
No - Not necessarily depends on conditions of critical surfaces
Yes - With a visual inspection
No - Would not take anything for granted
No - Only after a visual inspection
Yes - Also chose 2. Depends on other conditions of the wing surfaces, wind
No - SOP to visual inspect
No - HOT not only comparison
No - HOT is only one factor in a long list of factors I consider
Yes - As long as the applicable type has been applied
Yes - You should always be aware of surface condition on the aircraft
Yes - Depends on lots of factors. Especially how close you to the HOT limit
Yes - Don't forget visual inspection
No - Runway has to be safe also, etc.
No - Conditions may cause an accumulation of ice even though within limits
No - I will still be the final judge and jury
Yes - We use most conservative HOTs applicable (if there no other factors affecting the integrity of the fluid D9)
Yes - But have a look first
No - Depends on fuel temp. wind, etc.
Invalid response - Yes provided you do wing inspection
Yes - But only after visual inspection
No - Gives you an idea, it's only one piece of info. Inspection is req'd
No - Tough to judge, often best to have a look
No - I know of no aircraft that is certified for flight in freezing precipitation
Yes - Providing we are anti-iced
Yes - If accompanied by a pre-take-off inspection
No - Not necessarily
Yes - I would still visually inspect
Yes - Provided the rep. surfaces show no failure of deicing fluid
Yes - You check anyway
No - Depends on your particular situation
Yes - From an aerodynamic point of view only. Normal WGT + balanced filed length criteria still apply
No - It's only a guide
No - Other factors could reduce the HOT .If no other factors are suspected to have reduced HOT I use HOT limits as printed after vis. inspection
No - You still have to do a pre-take-off inspection
No - Depends if fluid has failed or not
No - Will visually check
No - Dependent on conditions i.e. wind, jet blast, etc.
No - Still require a visual check especially close to HOT limits being exceeded
No - Conditions may change
No - Always perform last chance inspection
No - Still inspect
Yes - So we were told
No - Too many variables
No - You should go back and have a look
Yes - None
Invalid response - Not familiar the term HOT
Yes - Would however double check wing
Invalid response - What kind of question is this? There are many, many factors which effect a safe T/O in these conditions
Yes - Provided Type 4 fluid has been used
No - Many need another CSI
Yes - Freezing drizzle is hard to detect pre-T/O check might be required depending on HOT
No - Visual inspection 1st is best
No - There are too many factors/variables
No - A visual inspection must be made
Invalid response - Don't know
No - Need to do a visual preflight check just prior to takeoff
No - Depends on conditions
No - Guideline only
Yes - There are no guarantees only reasonable estimates
Yes - If confirmed by visual inspection & limited by runway surface conditions
Yes - Provided runway in good condition
Invalid response - Too general a question - Too many variables
No - Current charts are guidelines, will not takeoff if outside HOT guidelines, but still do inspection if within
Yes - Providing that the conditions have not deteriorated
Yes - Provided fluid has not failed
No - T/O in FZRA/FZDZ is not recommended. Better to wait for precipitation to pass through
No - Not unless rep surface is clear
Yes - When HOT limits is supposed to mean it's safe to T/O. In freezing rain I would do visual inspection from cabin if in doubt
No - It is a guide only

Yes - After a visual inspection
No - Look and live
No - All depends how heavy precip
No - Judgment always plays a part...HOTs are just guidelines, not written in stone
Yes - Providing no other special circumstances i.e. jet blast etc.
No - HOT guideline only - suspect to assure clean surface
No - T. props without HOT wings should not fly in ZR
No - This is subjective
Yes - With a pre-takeoff inspection
No - I'd do a visual inspection prior to T/O
Yes - As far as clean wing is concerned, however other factors must be considered
Yes - Usually
No - Visual check may be required It's not in black & white
No - Always suspicious about freezing drizzle/HOT limits for it
No - Other factors affect us i.e. wind velocity, jet blast, aircraft skin temperature
Yes - Unless we have reason to believe that critical surface contamination has occurred
No - All days are different, it's the captain's decision, for that day
No - Not if
No - Only if aircraft is in fact clean of all contaminants
No - Depends on individual conditions
Yes - Unless you have information or reason to think that there might be fluid failure
Yes - Provided no other variables affecting you such as jet blast, strong winds, etc.
Yes - With an inspection
No - Again, a matter of confidence given the circumstances
Yes - Most A/C not certified for flt in freezing precip.
Invalid response - Are you kidding? Who made these questions
No - A visual inspection should always be made prior to T/O
Yes - But not mod. on heavy precip.
Yes - With caution
No - An inspection should be done in any type of freezing precip.
Invalid response - Maybe
Yes - HOTs are extremely conservative usually the HOT expires before whole A/C has been deiced. Therefore T/O is impossible i.e. Grounded
No - Runway conditions. X-wind component, aircraft crew have to be assessed
No - Always check prior to going
Invalid response - Often other areas were not deiced - fuselage nose, sides vertical stabs.
Yes - Should there be any doubts one should always perform a PCI
Yes - Provided you have no ice accumulation or reason to doubt validity of fluid
Yes - Provided no other source has contaminated the A/C
Yes - Assume clean state & proper aircraft cert/equipment/traffic conditions
Yes - With a quick view of wings from cockpit, and again dependents on weather conditions
Invalid response - Responsibility lies with PIC
No - Last chance inspection must be completed
No - It depends
No - During freezing drizzle, I would visually check the upper wing surface before T/O
Invalid response - Maybe
No - Visual inspection must pass
No - Other factor may reduce HOT time
Yes - Probably, but no two T/Os are the same!
Yes - If the net conditions are light freezing drizzle
Yes - If there is doubt then a pre-take-off inspection required
Yes - You must check the wing just before take-off
No - You need to make a visual inspection
Yes - Assuming runway conditions and all other factors have been taken into account
Yes - With proper fluid application + proper visual inspection of wings
Invalid response - Not always
Yes - Many variables obviously - but generally speaking, YES
Yes - As long as other factors such as runway conditions, wind & weather are considered to be OK
Invalid response - I do a visual check
Yes - I would inspect wing from cabin anyway
No - Props
Yes - Check all other parameters as well
Yes - As long as you do a pre-take/off inspection
Yes - As long as conditions have not changed
Yes - However different conditions warrant different approaches
No - Depends on quality of deice and accuracy in determining conditions
No - Inspect
No - Dependent on relevant influencing conditions, a tactile test or other pertinent test should be performed
No - Should visually inspect
No - Freezing drizzle insidious
No - There are no guarantees, there are many factors(taught in training) that can effect HOT
Yes - We have sufficient on board deicing equipment
No - Is this a physiology test
Yes - Provided there is no visual indication of contamination
No - Rate & surrounding conditions needed to make assessment
Yes - Depends on the conditions, we would have to assess it
Yes - Depends on OAT & volume of precip. etc.
No - Use common sense (The only problem with common sense is, it is not so common)
Invalid response - Not necessarily, not usually dependent on airport surface condition
No - Other factors must be considered
No - HOT is not a hard fact. Some judgment have to be used by pilot

No - OAT surface winds, skin temp. all affect the accumulation rate; visual inspection is advisable prior to all T/O's
Yes - Generally- I sure monitor the situation carefully
No - What are you asking here? Do we need to inspect? Yes! Are we allowed to T/O in type? Yes
Yes - Only if you consider it safe
No - Again always fall back on visual inspection
No - Visual inspection is still required
No - Spraying an A/C for any conditions doesn't guarantee a safe T/O
No - Need to look at wings if more than halfway into holdover time
No - Inspect prior to T/O
Yes - Given that a pre-T/O inspection indicates to the affirmative
Yes - Unless fluid failure/inadequate deicing
No - Runway may become too slippery etc.
No - Almost every situation is different
No - Visual inspection a must
No - All factors must be considered but likely OK
No - Fuel tank will also affect your HOT
No - Other factors can reduce the time, e.g.. moisture content, jet blast
No - Each T/O in wing conditions has to be assessed individually
Yes - With a clean wing and anti-ice spray
No - Individual conditions always assessed i.e. OAT rate skin, temp. etc.
No - What if JBI is 0.1 + 5-10 kts crosswind
No - Other variables are involved
Yes - Isn't that the whole idea
No - Check for accumulation
Invalid response - Unknown - as a recent AFM amendment has confused the issue
No - Freezing precip has always commanded the most respect
Yes - But with a visual inspection
No - Wing condition, wing temp. etc.
No - Last chance inspection is always done
Yes - Always inspect prior to T/O even when within limits
Yes - Always use most conservative HOT
Yes - Req. inspection
Yes - It better be
No - Wind? Jet blast effects while taxiing etc.
No - No T/O during freezing precip
No - Aircraft de-anti-icing systems must be able to cope with amount of icing
Yes - After visual inspection
Yes - Assuming the runway is acceptable
No - WEATHER conditions change
No - Guide line only
No - Pre-take-off inspection and/or other factors must be considered
No - Many other factors can effect the validity of HOT's
No - Conditions can always exceed tolerance allowed
Yes - Depends on conditions & fluid type. Lower end of time window used
Invalid response - Use your head
No - Not unless the critical surfaces are clean and runway is operational (JBI)
Yes - Unless specific conditions exist: High wind, jet blast, use of reversers
No - Fluid may not prevent icing during climb out
No - Not without an inspection
No - Yes with anti-ice fluid, maybe or maybe not with deice fluid (inspection required)
No - I would do visual be T/O
No - Actual condition of wing (i.e. clean) prior to T/O is only assurance of safe flt in any condition. Experience may allow use of HOT limits
Yes - As long as inspection is made and the wing is clean
Yes - If not what is the point of HOT
No - Visual inspection still required
No - You must still make a visual inspection
No - Depends on wing & runway, surface conditions + braking
No - Take a look first
Yes - In conjunction with a check of rep. surface
Invalid response - Would consider taking off only if I knew the altitude of the warm air
Yes - Check if in doubt
No - I would inspect
No - Pre-take/off inspection to verify
No - But generally, yes
Yes - With visual inspection
No - Still carry out a pre-take/off inspection
No - This area requires more study for procedures to be made for safe flight
No - We are not certified nor is the wing clean
Yes - At captain's discretion
No - HOT is not a guarantee at this time - other factors can reduce published HOT
No - Not recommended
No - Any time there is FZDZ you are less safe than if there was no FZDZ. As PIC I am accepting this fact & making a calculated risk
No - Not without a visual or tactile inspection
Yes - Unless you have reason to suspect a problem in which case a visual of both wings is the only safe course of action
Yes - Probably - depends on several factors
No - A/C not certified for flight in freezing drizzle
No - Freezing rain & drizzle can easily overwhelm Type I fluid or most fluids for that matter. Delay is warranted
No - (Frankly) would you not verify!
Yes - Maybe
Yes - My concern would be more on the runway conditions
Yes - If an adequate pre-take-off inspection reveals no contamination
No - I feel HOT limits are guide lines and tactile inspection should be done
Yes - If not change charts
No - Must have a look
Yes - I'm fairly confident that the crew has done the job properly and that the time provided will give me a clean wing until wing anti-iced
No - Fuel temperature on arrival? etc.
Yes - With a pre-take-off inspection
Invalid response - Perhaps

No - Not necessarily - other factors come into play - including runway surface condition, JBI, X-wind component, etc.
Invalid response - Don't know. No info available
Yes - Any doubt, I inspect & satisfy my concerns of clear wing & tail
No - We always do a last second wing inspection
No - Guidelines, intensity will require caution, visual inspection wise
No - There may be other factors at work (wind etc.)
No - FZRA & FZDZ are forms of precip you cannot take a chance with
No - Too many other variables associated
Yes - From a fluid failure and wing condition point of view. Transport Canada monitors the testing of fluid and holdover times. That's good
No - As intensity is so difficult to judge a pre-take-off inspection should be considered
No - Not absolutely - visual inspection still required
No - I will check representative surface & precip movement on A/C first
Invalid response - Depends
Yes - Depends on aircraft type and certification
Invalid response - Not necessarily
Invalid response - I would check
No - Pre-take-off inspection still required
No - Freezing rain or drizzle are a no go situation
Invalid response - There are many factors to consider (including the runway surface) but the aircraft I fly can operate in light freezing drizzle
Yes - According to CARS
No - A visual inspection is always required prior to take off
No - I feel freezing precipitation doesn't guarantee anything
No - No guarantee in this world - common sense
Yes - But would still do pre-take-off inspection
No - HOT limits are a guideline only
Yes - Without more detail, the answer would be yes
Invalid response - I never rely on HOT limits alone
Invalid response - We do not use "HOT" term
No - Depends on how much is falling and if there is any accumulation
Yes - My experience indicates that the HOT is reliable, but an inspection & conservative assessment should be made
No - Icing influenced by too many variables to justify take off based on time without usual/tactile inspection
No - The in-flight icing may exceed the certified capabilities of the aircraft's ice protection systems
Yes - With trepidation
No - Each departure would have to be evaluated separately
Yes - With a visual check also providing everything clean
Yes - Depending on inspection
Yes - If the wing inspection is O.K.
No - Legally within limits
No - Pre-take off inspections necessary in my opinion
No - Super-cooled droplets above may exceed aircraft specs
No - I don't like freezing precipitation
Yes - I would still do a pre-take off inspection
Yes - Unless you are close to the limit then do an inspection
No - Drizzle could easily become freezing rain and change the outcome drastically
Yes - You should be able if sprayed properly
Yes - After considering many factors e.g." A/C conditions, rwy conditions etc.
Yes - If well within - yes. If close to HOT - no
Invalid response - ZL requires visual or tactile inspection for any own satisfaction
No - Require inspection of crit. surfaces
No - Still must visually confirm nothing is adhering to the wing
Yes - Providing all parameters are met
Yes - If deiced properly
No - Possibly
No - Runway conditions check wing check
Yes - Problem is difference between FZDL- to FZRA-. e.g.. drop size
No - But the probability is fairly high that we are
No - Can safely take off with clean critical surface, being within HOT time does not guaranty this
Yes - With pre-take off inspection
No - Should get pirep if able
No - Our HOT in this instance is 5 minutes. That is not ***
Yes - If fluid performs as per specification
Yes - The system should work
No - Although we do operate in these conditions I believe it is impossible to be 100% sure of wing conditions
No - Other factors as well must be taken into consideration - e.g.. wind/jet blast etc.
Yes - Depends on fluid type
No - Depends
Yes - Its suppose to, isn't it?
Yes - If A/C anti-ice systems are operating
Yes - If close to HOT limits still do pre-take off inspection
Invalid response - Maybe
Invalid response - I do not understand HOT limits this term isn't familiar with our company freezing drizzle we apply Type I,II, or IV not a hot spray
Yes - Depends on the day
No - You must still look
No - A pre-take off inspection must be completed
Yes - Check the range
Yes - I am confident that with Type IV fluid I could safely take off unless conditions changed ie. higher wind, change in OAT etc.
No - But the company supervisors sometimes think so
No - Evaluation of departure area weather required
No - Lots of cold fuel may cause ice formation regardless of HOT
No - Generally it is probably safe but HOT limits are guidelines only, not guaranteed times
Yes - But not knowing what conditions are at say 100 is 200 ft these maybe heavy freezing rain
No - Many factors here - JBI's etc.

Yes - Other considerations ie. runway aircraft etc.
No - Always check you may be getting more precipitation than you thought, etc.
Invalid response - Airplane OK, runway maybe not
No - Depends... type fluid... temp. of wings
Yes - If you can identify that the critical surface is not contaminated
No - Not guaranteed, but a pretty good guide. Use it as a basic tool for decision
Yes - I've found freezing drizzle T/Os rarely occur and then its impossible to assess without tactile inspection (is it wet or frozen?)
Yes - If critical surface inspection does not satisfy you
No - HOT are used as guidelines only
Yes - Depending on the vertical extent of the freezing precipitation and fluid in use

D10. During preflight is data available on the expected delay due to:

Data Available on Expected Delay due to:	Yes	Yes at some airports	No
Type of precipitation	35%	45%	20%
Pireps concerning critical precipitation	33%	49%	18%
Possible runway contamination	46%	45%	10%
Possible need to reduce take-off weight	41%	27%	31%

D11. Do you have any general comments on devices, training and/or procedures to improve safety in icing conditions - please attach comments

More high quality videos of fluid failure.

Better videos with better visual clues.

Deice closer to active runway esp. when using Type I. Keep it simple!

Install deicing pads like the wash centre at Pit. P.A. USA on the or near the runway.

Type 4 is an excellent fluid for old-over effectiveness and ease of assessing icing of wing. If a reliable sensor could be developed to warm of ice or virtual surfaces this would be ideal also. P.S. Do not impede more restrictions on the operation as I don't feel this will improve safety. There is already enough legal implications to restrict views; everything is being done to run a safe operation!1

Program works well - I feel however that fluid is wasted at times during very light snowfall when the captain should be able to depart without a spray but since there is a snowflake in the air, we must spray.

Loose snow contamination better taken care of by broom/sweep. Once you have deiced with fluid, you are committed to HOT and further deicing situation.

I think my comments throughout pretty much covers it.

More training that would include visual aids.

To me there are two (1) more education for flight crews regarding ice and deice fluid. (2) deicing bans near the button of the departure runway.

Leave the decision to deice/anti-ice with the Capt.

(1) Have company or airport control surface inspectors at big airports, at night close to departure runway. (2) Show more videos or pictures on fluid breakdown, perhaps this could be done with annual briefs.

Detection devices and/or pre take-off inspection performed by ground crews would greatly improve safety by removing most of the present guess work.

Get the refresher information out early. Don't try and make it an exact science.

Get better ATC to maximize delays on ground ex 42!

Deicing closer to runway environment would hell a great deal.

More training would help - reliable devices would be a Godsend!!

Large airline operation has complete department for this.

Info. on what fluid failure looks like!

Please do not add anymore rules and restrictions, keep it logical and simple.

(1) deice police in YYZ only increases pilot anxiety (2) would like fluid failure training (3) deice pads should be positioned by runway threshold.

More use of Type 4.

Have deice pads available close to button of each runway.

Deicing bays at the holding points of all major runways.

Try to get these infos with our ATC system, touch the critical surface - deicing at threshold runway.

Icing operations standards are more than adequate (As long as operators maintain established procedures)

Give us training in recognition of deice failure. Put the deice bays where they should be, close to the dep. Runway.

Should always deice right by T/O runway.

Would like to see more awareness on fluid failure this seems to be an area of much confusion to most people I talk to.

Indoctrination on subject "Fluid Failure" necessary.

Generally speaking major airline's standard is good. Smaller outfits might not have the time, money, facility to keep their crews well informed about icing.

Replace Transport Canada if in doubt tape with one that helps eliminate doubt.

It is important to establish HOT from time to time the deicing/anti-icing commences at the critical surfaces.

A device to warn of fluid failure would be a great asset to flight safety.

Where appropriate, contract the deicing out and have a spray booth at the departure end of runways. Include reclamation of fluids to be filtered, re-mixed, heated and then re-used.

See attached.

More in-depth visual aids in identifying failed fluid.

Each airport deicing handling is different with regards to communication and whether engines should be running. They should all be the same. Investigate Halifax vs. Ottawa vs. Toronto procedures.

Good questions.

Captain should have last word.

Large carriers are safe, man others require more waste i.e. not affiliated with a major airline.

More practical training for flight/ground crews.

Its the small aircraft operators that show poor regard for the rules. Lack of enforcement.

I would like more info on fluid failure and training ground crews receive.

Do not make it more complicated with more bureaucratic controls.

Yes. Please get rid of stupid regulation. For example, I now "must" inform the passengers that the aircraft is going to be deiced. Fine. But I don't have to say a word if I am not going to deice the aircraft, even if it were covered in ice. Go figure! By the same logic - I should inform the passengers that the airplane is going to be fueled up. But of course not if I'm not. Where does it end?

Re: confidence - CI should be in annual recurrent training.

Get line pilots involved and listen to them. Staff people are trained to apply a "process" to operations by filling in "variables" to an "equation" based on company policy. This approach is fundamentally biased against the line.

Deicing done closer to the runway where possible.

Deice and anti pads should be located closer to runway in use. Car wash style i.e. drive thru model such as at Paris CDG.

A cold wing with dry snow not adhering to surface should not be deiced.

Clean cockpit windows after de/anti-ice. Hold de/anti ice crew responsible for incompetence.

Good idea include on NOTAMS or ATIS. Would like to see items includes CA avail for training.

One crash has turned the whole world into deicing "experts".

Accurate and remote sensors would help.

You might consider conducting this research during or just after the "ice" season when memories are fresher.

Wing ice detectors should be mandatory as looking out glycol covered window proves nothing.

Get real! Return the possibility to the Captain.

Ice detection devices would help greatly.

There is always more room for improvement i.e. continuous better education.

Use stronger fluid in heavy precip; have carriers add some fuel for longer taxiing.

More training done by "qualified" people is needed.

See #C3.

Deice pads should be near TO runway on all airports - min taxi time after deice.

The challenge of clean wing will never be a black and white situation. Experience and common sense will always be required.

Establish deicing bay just prior to departure runway at all stations. Establish standard air ground comm procedure.

A lots of importance is given to deicing but poor management some occur on ground/ATC/taxing/big line-up and HOT has expired. Better procedure before deicing to ensure efficiency way out from deicing pad to T/O time.

Glad to see this is being looked at by a pilot group.

As noted before.

We should get proper system for deice and quick deployment of A/C for take-off. Save the money or sensors get the a/c in the air quickly.

A pad just before the TO runway of a "car wash" type will eliminate practically all return to gate for deice/anti-ice again.

Fluid deicing has become a panacea for the uninformed public - we need to encourage mechanical deicing where appropriate vs. fluid deicing which can be a hazard; ie. (snow sticking to fluid vs. blowing of dry wing).

I'm weak on specific fluid failure indication - I'll re-read the "icing" section of our pubs.

Deice trucks owned and operated by the airports positioned at the button of the active runway. Spraying would take no more than 1-2 mins and then depart.

One concern I have that has never been addressed is that there is no special attention paid to making sure the overwing windows provide optimum viewing. They are often dirty and the plastic inner window is often cracked. . This makes viewing the wing difficult especially when a pilot is standing in a brightly lit cabin looking out at a poorly lit wing vehicle leaning over passengers who are a little nervous about the whole procedure.

Please circulate a pamphlet on fluid brake down with detailed specifics and photos.

Do not try to legislate for stupidity - CRM now takes care of an ignorant captain.

Generally too much deicing fluid is unnecessary sprayed on aircraft where not needed.

Need defined standard for application equipment i.e. pressure, flow, warm-up line etc.

This is late return due no ALPA(c) procedure for handling boxed questionnaires at office. Please mail out individually next time.

Occasionally ground areas spray a snow covered cold wind when simple sweeping would be more appropriate.

ATC needs to get into the 90s, they move airplanes too slowly. Our American ATC friends do a much better job.

Engine on de/anti icing at bottom of runway; all airlines regardless of size, sharing facilities at runways; training in Aug. ????; training could be done with in home video and Q&A; under certain conditions i.e. cold wing, cold temps, cold snow (light) nothing should be done to the wing.

There is no substitute for sound judgment and good airmanship.

I think this whole program has gotten out of hand. We have non-pilots making pilot decisions and too many times deicing and anti-icing takes place when not necessary. Dry snow has blown off cold wings forever and will continue to do so until the laws of physics are amended. Each situation is different. There is no apparent logic used but rather it is CYA time by the "qualified" ground staff. This occurs far too often and at a horrible cost to the carriers and the environment. We now have empowered everyone from F/A's to all the ground staff to be spooked by something they know, very little about and the manner in which they confront flight crew is a bigger problem than the few flakes of snow that may be sitting on the wing. I have deiced when necessary for thirty-two years and I will continue to do so but all the Dryden Commission has done is confirm that the A/C that crashed should have been deiced. There is a difference….

Need to improve ground training.

Why not have an exterior inspection closer to end of T/O runway. Not a lengthy insp. Just a quick look

Pilot - common sense approach.

More emphasis and info should be available about "not" using fluids on very cold wings covered with dry snow, and when snow can be expected to blow off critical surfaces during T/O roll. Keep the lawyers our of the loop and let the technical folks do their job without a "protect your butt" bias.

Please certify the airplanes to operate/or not in the actual conditions that the industry expects us to operate.

I would tend to leave present guidelines in place and allow the crew to use these guidelines to make a decision to deice or not. If the bureaucracy becomes too excessive, there will be no operations in winter conditions. Allow the crew to use their experience to make a good decision, one way or another.

Deice pads closer take-off points is #1 in my view.

Aircraft icing is another example of someone trying to put quantitative limits on a qualitative variable. The PIC judgment of the risk is the most important factor. There are just too many variable (wind, time, dew point, aircraft skin type, cloud condition, light, concentration and type of fluid) to ensure safety after any extended period of exposure to freezing precip. So my suggestion is that the aircraft get deiced immediately prior to departure, only. Larger airport facilities are less effective. As I have said

in A3 at YYZ, we line up to get sprayed then line up to take-off. We should instead line up to take-off and get sprayed just prior (#2 for take off) to departure. Surely the deice equipment can be moved to the holding bays of the active runway(s). All that is required is a fluid recovery system for the departure area of each runway.

Restriction at CYUL to shut down both engines for deicing often results in HOT being exceeded and necessitates return to deicing pad. Why can't they use same procedure as everywhere else for live deicing?

Better deicing locations at airports and better fluid in regards to holdover times (longer)

You guys are beating a dead horse. i.e. enough attention has been paid to the icing issue! How about controlling fly by night operators who don't maintain strong maintenance standards like "Air Transat, Royal, Kelowna Flight Service, Westjet.

Greater emphasis on training for everyone.

I am not so sure that all operators follow the same safety standards. I see a big advantage for public safety to have an independent inspector at every airport to help, and insure that the flying surfaces are free of ice formation.

Deice gantry at departure end of runway for all aircraft would be a great asset to safety.

Maintenance should not over rule pilots. But maintenance can in our airline (bad).