



# **EAC**

# **No. 91\_12**

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## **Criteria for Approval of Category III Landing Weather Minima**

### **EAC91-12.1 Purpose**

This supplement is issued to advise Egyptian operators an acceptable means, but not the only means, for obtaining approval of Category IIIa or Category IIIb landing weather minima and the installation approval of the associated airborne systems.

### **EAC91-12.3 Definitions**

- (a) Category IIIa: A precision instrument approach and landing with no decision height (DH), or a DH below 100 feet (30 meters), and controlling runway visual range not less than 700 feet (200 meters).
- (b) Category IIIb: A precision instrument approach and landing with no DH, or with a DH below 50 feet (15 meters), and controlling runway visual range less than 700 feet (200 meters), but not less than 150 feet (50 meters).
- (c) Category IIIc: A precision instrument approach and landing with no DH and no runway visual range limitation.
- (d) Decision Height (DH). A specified height at which a missed approach must be initiated if the required visual reference to continue the approach to land has not been established.
- (e) Alert Height (AH). A height defined for operational use by pilots (100 feet or less above the highest elevation in the touchdown zone), above which a Category III approach would be discontinued and a missed approach initiated if a failure occurred in one of the required redundant operational systems in the airplane or in the relevant ground equipment. Below this height, the approach, flare, touchdown, and, if applicable, rollout may be safely accomplished following any failure in the airplane or associated Category III systems not shown to be extremely improbable. This height is based on characteristics of an aircraft and its particular fail operational airborne Category III system.
- (f) Fail Operational Category III System. An airborne system which provides redundant operational capability down to touchdown and, if applicable, through rollout. Fail operational capability may be provided by automatic systems, manually flown systems, or a combination of both. The redundant operational systems must have no common failure modes, and need not be the same. If one of the required Category III systems fails below the AH, the flare, touchdown, and rollout, if applicable, can be accomplished using the remaining operational system or systems. In manually flown systems, the remaining operational system or systems must be available to either pilot without pilot action.
- (g) Automatic Fail Operational Category III System. A fail operational system which provides redundant operational capability using automatic systems. If one of the automatic systems fails below the AH, the flare, touchdown, and rollout, if applicable, can be accomplished using the remaining automatic system(s).
- (h) Fail Passive Automatic Flight Control System. An automatic flight control system which, upon occurrence of any single failure, should not:
  - (1) Cause significant displacement of the aircraft from its approach path or altitude loss below the nominal glidepath.
  - (2) Upon system disconnection, involve any out of trim condition not easily controlled by the pilot.
  - (3) Cause any action of the flight control system that is not readily apparent to the pilot, either by control movement or advisory display.
- (i) Approved Simulator. For the purposes of this AC, approved simulators are those simulators approved by the ECAA for the specific Category III maneuvers required in paragraph 10.
- (j) Rollout Control System: A system which provides either automatic control or instrument guidance for manual control of lateral steering for rollout until manual control of the aircraft by visual reference is assured.
- (k) Proof of Concept Testing. "Proof of concept testing" is defined as a generic demonstration in a full operational environment of facilities, weather, crew complement, aircraft systems, environmental systems, and any other relevant

parameters necessary to show concept validity in terms of performance, system reliability, repeatability, and typical pilot response to failures as well as to demonstrate that an equivalent level of safety is provided. "Proof of concept may be established by a combination of analysis, simulation and/or flight demonstrations in an operational environment. In certain cases, operational "proof of concept" may not be necessary if the validity of the concept was demonstrated during the type certification approval of the Category III airborne systems and the Director of Flight Operations determines, on a case-by-case basis, that "proof of concept" has been established.

#### **EAC91-12.5 Discussion.**

The following criteria are issued to identify the airport and ground facilities, airborne systems, training requirements, and maintenance standards, which, if met, will provide a basis for approval of Category III landing minima.

#### **EAC91-12.7 Operational Concepts**

The weather conditions encountered in Category III operations range from an area where visual references are adequate for manual rollout in Category IIIa, to an area where visual references are inadequate even for taxi operations in Category IIIc. To maintain a high level of safety during approach and landing operations in very low visibility, the airborne system and ground support system requirements established for Category III operations should be compatible with the limited visual references that are available.

The primary mode of Category III operations is automatic to touchdown using automatic landing systems which do not require pilot intervention. However, pilot intervention should be anticipated in the unlikely event that the pilot detects or strongly suspects inadequate aircraft performance as well as when he determines that an automatic touchdown cannot be safely accomplished within the touchdown zone.

To be approved for Category III operations, the airplane and its associated systems should be shown to provide sufficient information to the flight crew to permit the safe completion of the approach, touchdown, and rollout or the safe completion of a go-around from any altitude to touchdown, following any failure conditions not shown to be extremely improbable. Additionally, the design of the cockpit instrumentation, system comparisons, and warning systems should be adequate in combination to assure that the pilot can verify that the aircraft will safely touch down within the touchdown zone and safely roll out if the controlling runway visual range (RVR) is reported at or above minima.

Although the primary mode is automatic to touchdown, these operational concepts do not preclude the use of systems to conduct Category III operations with the pilot in the active control loop if "proof of concept testing" demonstrates that these systems provide an equivalent level of safety.

- (a) Safety of Go-Around From Any Point in the Approach. An aircraft approved for Category III operations should be capable of safely executing a go-around from any point in an approach prior to touchdown with the aircraft in a normal configuration. This is appropriate to provide for go-arounds due to air traffic control (ATC) contingencies, rejected landings, loss of visual reference, or missed approaches due to other reasons. The evaluation of this capability is based on normal Category III operations at the lowest controlling RVR authorized and should account for factors related to geometric limitations during the transition to go-around, limited visual cues that are available, autopilot mode switching, and other pertinent factors. For aircraft in which a go-around from a very low altitude may result in an inadvertent touchdown, the safety of such a procedure should be established considering relevant factors such as operation of auto-spoilers, automatic braking systems, autopilot mode switching, auto-throttles or auto-thrust, and other pertinent systems associated with a low altitude go-around. If the occurrence of any failure condition in the airplane or its associated systems, including critical engine failure, could preclude the cockpit crew from executing a safe go-around from low altitude, Category III operations may be conducted with these airplanes only if the total airborne system has the capability to permit an approach, touchdown, and rollout to be safely continued and completed following any failure conditions not shown to be extremely improbable. Additionally, in the event of such a failure after passing 100 feet above ground level (AGL), the cockpit cues or indications should not cause the

flight crew to attempt a go-around. If an automatic go-around capability is provided, it should be demonstrated that a go-around can be safely initiated and completed from any altitude to touchdown. If the automatic go-around mode can be engaged at or after touchdown, it should be shown to be non-hazardous. The ability to initiate an automatic go-around at or after touchdown is not required.

Information should be provided to the crew regarding appropriate procedures for go-around and expected altitude loss during a properly executed automatic or manual go-around. Expected height loss should be provided to the crew as a function of go-around initiation altitude for the region below 100 feet AGL. In the event that an aircraft has been demonstrated to be capable of Category III operations with an engine inoperative, height loss information should also be provided for the engine-out case.

- (b) Fail Passive Category III Operations. Fail passive Category III operations are conducted with a 50 feet DH and are limited to Category IIIa. Since a fail passive Category III system does not necessarily provide sufficient redundancy to successfully continue the approach and landing to touchdown following any failure in the flight control system not shown to be extremely improbable, a DH of 50 feet is specified. A DH is established to ensure that, prior to passing 50 feet, the pilot determines that adequate visual reference is available to verify that the aircraft is in a position which will permit a successful landing in the touchdown zone. If this visual reference is not established prior to passing DH, a go-around will be executed. A missed approach will also be initiated if, after passing DH, visual cues are lost or a reduction in visual cues occurs which prevent the pilot from continuing to verify that the aircraft is in a position which will permit a successful landing in the touchdown zone. In the event of a failure of the system at any point in the approach to touchdown, a missed approach will normally be required.

If the need to initiate a go-around below 100 feet AGL due to airplane failure conditions has been shown to be improbable, a fail passive automatic landing system may be used for Category IIIa if the system is shown to provide the capability to safely touch down in the touchdown zone or to safely complete a go-around from any altitude to touchdown following any failure conditions not shown to be extremely improbable. Due to considerations of approach geometry related to factors such as "wheel to glideslope antenna height," "wheel to pilots eye height," and cockpit visibility, authorization for fail passive Category IIIa operations may not be appropriate for all sizes or types of aircraft. Applicability of Category III to such fail passive systems is limited to those aircraft for which the concept can be shown to apply by "proof of concept testing." Typical arrangements which could be used to meet the requirements for operating to a 50 foot Category IIIa DH include the following:

- (1) A single, monitored fail passive flight control system with automatic landing.
- (2) A fail operational automatic landing system which has reverted to fail passive due to the occurrence of a failure during flight, or has been dispatched in a fail passive configuration.
- (3) A monitored fail passive head up display (HUD) or head down display (HDD) designed for a pilot in the active control loop flight guidance system with instrument displays suitable for monitoring, by the pilot not flying, of the overall performance of the Category III system and the performance of the pilot flying.

- (c) Fail Operational Category III Operations. Fail operational Category III operations are conducted with fail operational flight control systems for use to touchdown in Category IIIa, and through rollout to safe taxi speeds in the lower limits of Category IIIb. The required redundancy may be provided by multiple automatic landing and rollout systems, by an approved manual backup capability to the primary automatic system, or by multiple advanced/sophisticated pilot in the active control loop systems. If credit is taken for manual capability, it should be suitable for landing to touchdown by reference to instruments alone for Category IIIa or for landing and rollout by reference to instruments alone for Category IIIb. The reliability and performance of the required redundant operational systems should be such that continued safe operation to landing in Category IIIa or landing and rollout in Category IIIb can be achieved following any failure conditions, not shown to be extremely improbable, which could occur below 100 feet AGL. An AH should be

specified in all fail operational Category III operations and operations with fail operational Category III systems are normally conducted in accordance with the AH concept. This is consistent with the system design philosophy which requires the airborne system to be capable of successfully completing a touchdown and, if applicable, a rollout following a failure which occurs after passing 100 feet AGL. It must be shown that an unsafe landing is extremely improbable based on various exposure times which are established for different types of operations. These exposure times are based on the time necessary to complete various phases of the approach, landing, and rollout beginning from a point at least 100 feet AGL. In the event that an aircraft design provides for inhibiting certain noncritical warning system functions after passing this point, such inhibiting features should not occur at height above 500 feet AGL. Conversely, even though certain alerts or warnings are inhibited, such a feature does not preclude an aircraft operator from setting an AH at a value lower than the height at which they are inhibited because touchdown would occur within the prescribed touchdown area even though a noncritical system failure occurs below this height and the warning is inhibited. If a DH is used by an airline for fail operational Category III, it should be compatible with the flight control and display systems installed in the airplane and with the AH to be used operationally. A DH limitation is only applied to fail operational systems in special cases: where a unique design feature in the airborne system or ground support system requires a DH limitation, or where a foreign country requires the use of a DH to conduct operations in that particular country. Additionally, an airline may apply a DH limitation to fail operational systems even though the use of a DH is not specifically required by these special cases. The following are typical arrangements by which the requirement for fail operational systems may be met:

- (1) Two or more monitored autopilot or integrated autopilot/flight director systems each with dual channels making up an automatic, fail operational system designed so that at least one system remains operative after a failure.
  - (2) Three autopilot or integrated autopilot/flight director systems designed so that at least two remain operative after a to permit comparison and provide necessary handover protection.
  - (3) A monitored fail passive automatic flight control system with automatic landing capability to touchdown and rollout, if applicable, plus an independent and adequately failure protected flight guidance system with dual displays.
  - (4) If "proof of concept" has been acceptably demonstrated for manually flown systems, two or more independent and adequately failure protected pilot in the active control loop flight guidance systems with independent displays may be used. For the flight guidance systems described in subparagraphs c(3) and c(4), the displays should include flare or flare and rollout commands, as applicable, displayed to each pilot.
- (d) Category III Operations Conducted with an Alert Height. The AH is specified by an operator of an aircraft and approved by the ECAA. This height must be compatible with aircraft system configuration, training, ground facilities, and other factors pertinent to the air carrier's operation. Although AH will be less than or equal to 100 feet AGL, it should generally be set at 100 feet AGL. By setting the AH at 100 feet AGL the aircraft may continue, in the event that a failure occurs in an element of the Category III system prior to beginning the final approach segment, to Category I or Category II minima as appropriate to the weather conditions and the equipment which remains operational on the aircraft. This is desirable to permit and encourage the use of Category III approaches and procedures by allowing continuation of an approach to Category I or Category II minima, as appropriate, without the need to reinitiate an approach. Additionally, for those aircraft equipped with Category III systems which have the capability to continue Category IIIa operations in the fail passive configuration following a failure which precludes a fail operational approach and landing, the approach may be continued, to the 50 foot DH, using the operative fail passive system if the controlling RVR is reported at or above Category IIIa minima and the landing may be completed if the necessary visual references are established prior to passing the DH.
- (e) Category IIIa Operational Concepts. Category IIIa operations can be conducted with either fail operational or fail passive automatic landing systems with minima no lower than 700 RVR (200 meters). If the system's reliability is such that the need

for a go-around below 100 feet AGL due to airplane failure conditions is shown to be improbable, Category IIIa operations may be conducted with systems which permit either the safe completion of the landing or the safe completion of the go-around following any failure condition not shown to be extremely improbable. As discussed in paragraph 91-12.7(b), fail passive Category IIIa operations are conducted with a 50 feet DH. The DH is established to ensure that, prior to passing 50 feet, the pilot determines that adequate visual reference is available to verify that the aircraft is in a position which will permit a successful landing in the touchdown zone. For Category IIIa fail operational approach and landing (as discussed in paragraph 91-12.7(c) without a rollout control system, visual reference with the touchdown zone is required and should be verified prior to the minimum height specified by the operator for that particular aircraft type. These visual cues combined with controlling transmissometer RVR reports of visibility at or above minima are necessary to verify that the initial landing rollout can be accomplished visually.

Lacking visual reference prior to the specified minimum height or in the event of receiving a report of controlling RVR below minima prior to this height, a go-around should be accomplished.

For Category IIIa fail operational approach and landing (as discussed in paragraph 7c) with a rollout control system, the availability of visual reference is not a specific requirement for continuation of an approach to touchdown. The design of the cockpit instrumentation, system comparisons, and warning systems should be adequate in combination to assure that the pilot can verify that the aircraft will safely touch down within the touchdown zone and safely roll out if the controlling RVR is reported at or above approved minima.

- (f) Category IIIb Operational Concepts. Category IIIb operations are conducted with fail operational landing systems which include a rollout control system for lateral steering control for rollout until manual control of the aircraft by visual reference is assured. These operations are conducted with systems which, after passing 100 feet AGL, permit the safe completion of the approach, touchdown, and rollout following any failure conditions not shown to be extremely improbable. For Category IIIb operations, the availability of visual reference is not a specific requirement for continuation of an approach to touchdown. The design of the cockpit instrumentation, system comparisons, and warning systems should be adequate in combination to assure that the pilot can verify that the aircraft will safely touch down within the touchdown zone and safely roll out if the controlling RVR is reported at or above minima. To be approved for Category IIIb operations with fail passive rollout control systems, it should be demonstrated under the most critical conditions expected in service that the airplane and its associated systems provide sufficient capability for the pilot to control the airplane so as to remain on the runway and stop within the runway length available following any airplane failure conditions not shown to be extremely improbable. To be approved for Category IIIb operations with fail operational rollout control systems, aircraft system failures not shown to be extremely improbable (after touchdown and until the point where the pilot's ability to manually control the aircraft by visual reference is assured) should not preclude the ability of the rollout control system to control the airplane so as to remain on the runway or present cues or indications to the pilot that would cause him/her to attempt a manual rollout using visual references. These capabilities should be demonstrated under the most critical condition expected in service.

Category IIIb operations may be conducted to minima as low as 300 RVR (100 meters) with fail operational Category IIIb landing systems which incorporate a rollout control system.

Category IIIb operations may be conducted to minima as low as 150 RVR (50 meters) with fail operational Category IIIb landing systems which incorporate a rollout control system.

If "proof of concept" has been acceptably demonstrated, Category IIIb operations may be conducted to minima as low as 600 RVR (175 meters) with fail operational Category IIIb landing systems which incorporate rollout control systems.

- (g) Runway Field Length Requirements. As in other operations, the runway field length requirements for Category III operations are based on the provisions of the

aeroplane flight manual. If an automatic braking system is used and the airplane flight manual contains landing performance data, based on this system, for runways which are clear and dry as well as grooved or porous friction coarse (PFC) runways which are clear but not dry, the required field length can be based on this data. However, to ensure that a high level of safety is maintained if other deceleration are used, the runway available for landing in Category III conditions should be the distance obtained by multiplying the required field length specified in the airplane flight manual by the following factors:

- (1) Category IIIa. The factor to be applied to determine the required field length is 1.15.
- (2) Category IIIb.
  - (i) Minima: 600 RVR (175 meters). The factor to be applied to determine the required field length is 1.15.
  - (ii) Minima: 300 RVR (100 meters).
    - (A) For grooved or PFC runways reported clear and dry as well as clear and not dry, the factor to be applied to determine the required field length is 1.3. However, this factor may be reduced to 1.15 if antiskid and reverse thrust systems are both installed and these systems are fully operational.
    - (B) Operations are not appropriate on non-grooved/nonporous friction coarse runways.
  - (iii) Minima: 150 RVR (50 meters).
    - (A) For grooved or PFC runways reported clear and dry as well as clear but not dry, the factor to be applied to determine the required field length is 1.3. Factors as low as 1.15 may be authorized in the future if operational experience indicates that the runway surface treatments (that is, grooving, PFC) and runway maintenance practices (that is, friction measurement and cleaning) are compatible with these lower factors. To use factors as low as 1.15, antiskid and reverse thrust systems should be installed and should be fully operational.
    - (B) Operations are not appropriate on nongrooved/nonporous friction coarse runways.
    - (C) A procedural means is not appropriate to meet the provisions for deceleration in paragraph 9c.

### **EAC91-12.9 Airports and Ground Facilities**

**Foreign Airports.** An applicant having Egyptian Category III approval may be authorized to use Category III minima at foreign airports on the ECAA approved list, provided that the airport is approved for Category III operations by the appropriate foreign airport authority.

### **EAC91-12.11 Airborne Systems**

- (a) Equipment for Category IIIa. The following equipment, in addition to the instrument and radio equipment required by the ECAR, is the minimum airborne equipment considered necessary:
  - (1) Two ILS localizer and glideslope receivers.
  - (2) Two approved radio (radar) altimeter systems.
  - (3) Redundant flight control systems.
  - (4) Missed approach guidance appropriate for Category III operations as follows:
    - (i) Attitude gyro (or equivalent) indicators with calibrated pitch attitude markings or pre-established computed pitch command display, or
    - (ii) Approved flightpath angle display.

**Note:** An automatic go-around system may be used with either of the above.
  - (5) Autothrottle or auto-thrust control system for operations approved without a DH. For operations with a 50 feet DH, autothrottles or auto-thrust are required unless it has been demonstrated by "proof of concept testing" that operations can be safely conducted without their use.
  - (6) Failure detection and warning capability.
- (b) Equipment for Category IIIb. Additional equipment, over and above that specified in paragraphs 4c and 6a, is required for Category IIIb operations.

- (1) All Category IIIb operations are conducted with an automatic or manual rollout control system. The accuracy and reliability of the rollout control system when considered in combination with the available visual cues and the characteristics of the ground support system will determine the lowest minima authorized for a particular operation.
  - (2) Fail passive rollout control systems are necessary to conduct operations below 600 RVR (175 meters).
  - (3) Fail operational rollout control systems are necessary to conduct operations below 300 RVR (100 meters).
  - (4) Unless a fail operational rollout control system is used, operations are not appropriate on runways with the runway centerline lights obscured by precipitation (that is, snow or ice).
  - (5) An instrument, annunciator, or crew procedures to reliably detect and alert the pilot to abnormal lateral or vertical deviations during an approach or flare or an extended flare beyond the touchdown zone, or excessive lateral deviations during rollout.
- (c) Deceleration System(s)/Procedures for Category IIIb. A means to determine that a landing can be reliably completed within the available length of the runway is necessary to conduct Category IIIb operations. This means will be demonstrated to the ECAA and, if acceptable, may be used to satisfy this requirement. At least one of the following means to assess stopping performance should be used:
- (1) A "runway remaining" indicator display showing length of remaining runway after touchdown.
  - (2) A deceleration display which can advise the pilot of the adequacy of aircraft deceleration to stop within the confines of the available runway.
  - (3) A ground speed indicating system (that is, inertial).
  - (4) An automatic braking system.
  - (5) A procedural means to assure a safe stop (not appropriate for minima less than 300 RVR (100 meters).
- (d) Airborne System Evaluation and Approval. Category IIIa or Category IIIb airborne systems may be evaluated during type certification, or they may be evaluated in conjunction with an ECAA approved program with an air carrier for aircraft in service with approved automatic landing systems.

### **EAC91-12.13 Pilot Training and Proficiency Program.**

- (a) Category III Ground Training (All Aircraft). The applicant's training program should provide training for the pilot in command and second in command in the following subjects:
- (1) Ground Facilities.
    - (i) The operational characteristics, capabilities, and limitations as applied to Category III operations of:
      - (A) The instrument landing system and critical area protection.
      - (B) The visual approach aids; that is, approach lights, touchdown zone and centerline lighting, signs, and markings.
      - (C) Transmissometer systems.
      - (D) Facility status, NOTAMS, or outage reports pertinent to use of Category III minima.
  - (2) The Airborne Category III System.

The operational characteristics, capabilities, and limitations appropriate to the Category III system(s) utilized such as:

    - (i) The automatic landing system.
    - (ii) Automatic throttle or auto-thrust system, if installed.
    - (iii) The flight director system, if installed.
    - (iv) Instrumentation and display systems.
    - (v) System and aircraft characteristics which determine the AH or DH, as applicable.
    - (vi) Other systems and/or devices peculiar to the particular installation; that is, computed go-around guidance equipment, failure warning systems, etc.
    - (vii) Description of the limits to which acceptable system performance has been demonstrated for wind and windshear.
  - (3) Other.

- (i) Review of operations specifications applicable to Category III operations.
  - (ii) Policies and procedures concerning the conduct of Category III operations on icy or snow covered runways, as well as those runways with braking action reported less than good.
  - (iii) Pilot reporting of ILS anomalies, approach lights, runway lights, touchdown zone, or centerline light outages, or other discrepancies which may be pertinent to subsequent Category III approaches.
- (b) Flight Training Program.
- (1) The following items are to be covered on both initial training and at least annually during recurrent training/proficiency checks for both pilot in command and second in command:
    - (i) Determination of the DH, if a DH applies, including use of radar altimeter.
    - (ii) Recognition of and proper reaction to significant failures encountered prior to and after reaching the AH or DH as applicable.
    - (iii) Missed approach and expected height loss as it relates to manual or automatic go-around and initiation altitude.
    - (iv) Runway visual range - its use and limitations, including the determination of controlling RVR and required transmissometers.
    - (v) The availability and limitations of visual cues encountered on approach both before and after DH, if applicable. This includes procedures for unexpected deterioration of conditions to less than minimum RVR encountered during approach, flare and rollout, demonstration of expected visual references with weather at minimum conditions, and the expected sequence of visual cues during an approach in which visibility is at or above landing minima.
    - (vi) The effects of vertical and horizontal wind shear (not required for recurrent training/proficiency checks).
    - (vii) Procedures for transitioning from nonvisual to visual flight.
    - (viii) Pilot recognition of the limits of acceptable aircraft position and flightpath tracking during approach, flare, and, if applicable, rollout.
    - (ix) Pilot recognition of and reaction to airborne or ground system faults or abnormalities, particularly after passing AH or DH. Subparagraphs (b)(1)(i) through (ix) should be incorporated into the training program in sufficient detail to show how each item will be accomplished during initial and recurrent training. For instance, it could be stated that subparagraph (b)(1)(viii) will be accomplished by freezing the simulator at or below 50 feet with varying visibility, wind components, runway lighting configurations, and offsets from centerline to demonstrate conditions that may be encountered on the line. The above listed items should be accomplished in an approved simulator unless the applicant can show that equivalent training is provided by the use of other training aids and/or devices.
  - (2) Initial Category III Flight Training Requirements For a Pilot in Command.
    - (i) Each pilot in command initially should receive training in flight or in an approved simulator in conducting automatic landings (manual landings, if appropriate) and missed approaches from very low altitudes which, for some aircraft, may result in an inadvertent touchdown during the go-around maneuver. If a simulator is used, the automatic flight control system, instruments, and annunciator system should be able to realistically represent the Category III airborne system performance and failure modes. Also, if training is done in an approved simulator, at least two actual automatic landings should be conducted in the aircraft prior to conducting Category III approaches with weather conditions below Category II minima. This can be accomplished during normal line operations.
    - (ii) Each pilot in command should satisfactorily demonstrate to either a company check pilot or an ECAA inspector the following requirements in an approved simulator or in flight with a suitable view limiting device (such as, variable density see-through training hood) in an aircraft configured with the appropriate Category III system and approved for these maneuvers:
      - (A) Two ILS approaches using the automatic landing system.

- (B) An automatic landing from one of the approaches.
  - (C) A missed approach starting from a very low altitude which may result in a touchdown during the go-around maneuver.
  - (D) For those Category IIIb operations predicated on the use of a fail passive rollout control system, a manual rollout using visual reference or a combination of visual and instrument references. This maneuver should be initiated by a fail passive disconnect of the rollout control system, after main gear touchdown and prior to nose gear touchdown, in conditions representative of the most adverse lateral touchdown displacement and weather conditions anticipated in normal Category IIIb operations with a fail passive rollout control system.
- (3) Second In Command Initial Flight Training Requirements. The flight training requirements for a second in command will depend on his/her assigned role during Category III approaches. Each second in command should satisfactorily demonstrate, to a company check pilot or an ECAA inspector, his/her ability to perform his/her assigned duties. If a second in command is not expressly prohibited by his/her company from performing the duties of the pilot in command while under the supervision of the pilot in command during Category III approaches, he/she is to satisfactorily accomplish the additional requirements of subparagraph (b)(2) of this section.
- (4) Recurrent Pilot In Command and Second In Command Proficiency Requirements.
- (i) Pilot In Command. At least annually, the pilot in command is to satisfactorily demonstrate to a company check pilot or an ECAA inspector the following requirements in an approved simulator or in flight with a view limiting device (such as, variable density see-through training hood) suitable for Category III in an aircraft configured with the appropriate Category III systems and approved for these maneuvers:
    - (A) Two ILS approaches using the automatic landing system.
    - (B) An automatic landing from one of the approaches.
    - (C) A missed approach starting from a very low altitude which, for some aircraft, may result in an inadvertent touchdown during the go-around maneuver.
    - (D) For those Category IIIb operations predicated on the use of a fail passive rollout control system, a manual rollout using visual reference or a combination of visual and instrument references. This maneuver should be initiated by a fail passive disconnect of the rollout control system, after main gear touchdown and prior to nose gear touchdown, in condition representative of the most adverse lateral touchdown displacement and weather conditions anticipated in normal Category IIIb operations with a fail passive rollout control system. However, if one of the required redundant operational systems is a manual system based on instrument displays, the pilot will be required at least annually to demonstrate proficiency, in flight or in an approved simulator, in the use of such a system. In the case of a pilot in command who is dual aircraft qualified, the proficiency requirements are to be accomplished at least annually for each aircraft type.
  - (ii) Second In Command. The proficiency requirements for a second in command will depend on his/her assigned role during Category III approaches. During each required proficiency check, the second in command is to satisfactorily demonstrate to a company check pilot or an ECAA inspector his/her ability to perform his/her assigned duties. If a second in command is not expressly prohibited from performing the duties of pilot in command during Category III approaches, he/she is to satisfactorily complete the additional requirements of paragraph 10(b)(4)(i).
  - (iii) Ground and Flight Training - Aircraft Interchange. When equipment interchange is involved, the pilot in command and the second in command are to receive sufficient ground and flight training to ensure complete familiarity and competency with the particular airborne Category III system on the interchange aircraft. The amount of training required will depend on

- the differences in the flight control and display systems, and cockpit configuration.
- (iv) Ground and Flight Training - Foreign Category III Airports. If the operator has authorization for Category III operations at an airport in a foreign country which imposes procedures or limitations different from those in Egypt, both the pilot in command and the second in command should receive sufficient ground and/or flight training to ensure familiarity and competence with these different conditions and requirements.
  - (v) Category IIIa/b Evaluation on Line Checks. Operators should give consideration to requiring an approach utilizing Category III equipment and procedures appropriate to crew qualification and aircraft capability whenever Category IIIa/b aircraft are utilized for line evaluations.

#### **EAC91-12.15 Operations Manual and Procedures.**

Procedures, instructions, and information to be used by cockpit crews are to be developed by each air carrier to include, as applicable, at least the following:

- (a) Cockpit Crew Duties. Crewmember duties during a Category III approach, flare, r, or missed approach are to be described in the operations manual. These duties should at least contain a description of the responsibilities and tasks of the pilot flying the aircraft and the pilot not flying the aircraft during all stages of the approach, landing, and missed approach. The duties of the third crewmember, if required, should also be explicitly defined.
- (b) Training Information. Suitable information and company policies on subjects specified in paragraph 10 should be provided in the operator's manual or available to crews in an equivalent form for reference use.

#### **EAC91-12.17 Maintenance Program.**

Each applicant is to establish a maintenance program, acceptable to ECAA, to assure that the airborne equipment will continue at a level of performance and reliability established by the manufacturer and approved by the ECAA. Applicants having existing ECAA approved maintenance/reliability programs for Category II equipment may extend their program to include Category III equipment. The following are minimum requirements:

- (a) Maintenance Personnel Training. Each applicant is to establish an initial and recurrent training program acceptable to the ECAA for personnel performing maintenance work on Category III airborne systems and equipment. Training records for such personnel are to be kept current and made available to ECAA for inspection.
- (b) Test Equipment and Standards. The applicant's program for maintenance of line (ramp) test equipment, shop (bench) test equipment, and a listing of all primary and secondary standards utilized during maintenance of test equipment which relates to Category III operation are to be submitted to the ECAA for determination of adequacy. Emphasis will be placed on standards associated with ILS receivers, flight directors, automatic flight control systems, auto-thrust altimeter systems, hydraulic or electrical systems applicable, and maintenance techniques and procedures of associated redundant systems.
- (c) Maintenance Procedures. Any changes to maintenance procedures, practices, or limitations established in the qualification for Category III operations are to be submitted to the ECAA for acceptance before such changes are adopted.
- (d) Engineering Modifications. Titles and numbers of all modifications, additions, and changes which were made to qualify aircraft systems for Category III performance are to be provided to ECAA.
- (e) Auto-land System Periodic Checks. Periodic auto-land system checks should be conducted in accordance with procedures recommended by the airframe or avionics manufacturer, or by an alternate procedure approved by the ECAA. A system should be established to show when and where the auto-land system was used and if performance was satisfactory. Use of the automatic landing system should be encouraged to assist in maintaining its availability and reliability.

### **EAC91-12.19 Approval of Category III Weather MINIMA.**

Prior to approval of Category III weather minima, the applicant should submit documentation to the FSSS Office which demonstrates compliance with the appropriate provisions of these criteria. This documentation will be evaluated by the FSSS prior to approval of Category III minima. When an applicant has satisfactorily shown compliance with the appropriate provisions of these criteria, operations specifications authorizing Category IIIa or Category IIIb minima with or without a DH, as applicable, may be issued. During the period (minimum of 6 months) following the issuance of these specifications, the operator will successfully complete the following operations demonstrations and data collection program in line service as part of the approval process to ensure continued performance and reliability of the system before operations down to the next succeeding lower minima are authorized. In unique situations involving newly manufactured airplanes where the air carrier's Category III maintenance program is approved for the proposed operation, this operations demonstration and data collection program may be initiated prior to the issuance of Category III operations specifications provided approval on a case-by-case basis is obtained from the ECAA.

- (a) Airborne Systems Operational Demonstration. One hundred (100) successful landings are to be accomplished in line operations, including training flights, using the Category IIIa or Category IIIb system installed in each aircraft type. If failures occur during the program, a determination will be made of the need for additional demonstration landings. The system should demonstrate reliability and performance in line operations consistent with the operational concepts specified in paragraph 7. In unique situations where the completion of 100 successful landings could take an unreasonably long period of time due to factors such as a small number of aircraft in the fleet, where ATC considerations significantly restrict the number of opportunities to utilize approved ILS facilities, or to obtain ILS critical area protection during good weather conditions, reductions in the required number of landings will be considered on a case-by-case basis and requires approval from the ECAA.
  - (1) The demonstration should be accomplished on approved ILS facilities. However, at the operator's option, demonstrations may be made on other ILS facilities if sufficient data is recorded to determine the cause of unsatisfactory performance. However, no more than 50 percent of the demonstrations may be made on such facilities.
  - (2) If an operator has different models of the same type of aircraft utilizing the same basic flight control and display systems, or different basic flight control and display systems on the same type of aircraft, the operator should show that the various models comply with the basic system performance criteria, but the operator need not conduct a full operational demonstration for each model.
- (b) Data Collection During Airborne System Demonstration. Each applicant is to develop a form to be used by cockpit crews to record the approach and landing performance. This form will be utilized whenever an approach and landing is attempted utilizing the Category III system, regardless of whether the approach is abandoned or concluded successfully. The completed forms and a summary of the demonstration results will be made available to the assigned FSSS inspector for evaluation. The form should, as a minimum, include the following information:
  - (1) Inability to Initiate an Approach. Identify deficiencies related to airborne equipment which preclude initiation of a Category III approach.
  - (2) Abandoned Approaches. Give the reasons and altitude above the runway at which approach was discontinued or the automatic landing system was disengaged.
  - (3) Touchdown or Touchdown and Rollout Performance. Describe whether or not the aircraft landed within the desired touchdown dispersion area with lateral velocity or crosstrack error which could be corrected by the pilot or automatic system so as to remain within the lateral confines of the runway without a requirement for unusual skills or techniques. The approximate lateral and longitudinal position of the actual touchdown point in relation to the runway centerline and the runway threshold, respectively, should be indicated in the report. This report should also include any Category III system abnormalities which required manual intervention by the pilot to ensure a safe touchdown or touchdown and rollout, as appropriate.

- (c) Data Analysis. Approaches on approved ILS facilities where the pilot was assured that critical area protection was provided which do not result in a successful automatic landing are to be fully documented.
- (1) ATC Factors. ATC factors which result in unsuccessful approaches should be reported. Examples include situations in which a flight is vectored too close in for adequate localizer and glideslope capture, lack of protection of ILS critical areas, or ATC requests the flight to abandon the approach.
  - (2) Faulty Ground Station Signals. ILS beam irregularities, such as those caused by other aircraft taxiing, over-flying the antenna, or where a pattern of such faulty performance, can be established, should be reported.
  - (3) Other Factors. Any other specific factors affecting the success of Category III operations that are clearly discernible to the cockpit crew should be reported. An evaluation of reports discussed in subparagraphs b(1), b(2), and b(3) will be made to determine system suitability for further Category III operations.
- (d) Approval of RVR Minima. When the data from the operational demonstration has been analyzed and found acceptable, an applicant for Category IIIa initially authorized 1,000 RVR (300 meters) may be authorized to operate to minima of 700 RVR (200 meters). If the Category III rollout control system has been shown to meet the appropriate provisions of FAA AC120-28C or equivalent, an applicant for Category IIIb initially authorized 600 RVR (175 meters) may be authorized 300 RVR (100 meters) at airports having suitable ground facilities. Additional approvals for operations below 300 RVR (100 meters) may be authorized in the future if the airplane is suitably equipped and operational experience indicates that the airborne and ground support equipment are compatible with the lower minima.
- (e) Foreign Air Carriers. (Reserved)

#### **EAC91-12.21 Operational Reporting.**

- (a) For a period of 1 year after an applicant has been advised that its aircraft system meets Category III requirements, and reduced minima are authorized, the operator is to provide a monthly summary to the ECAA of the following information:
- (1) The total number of approaches where the equipment constituting the airborne portion of the Category III system was utilized to make satisfactory (actual or simulated) approaches to the applicable Category III minima (by aircraft type).
  - (2) The total number of unsatisfactory approaches by airport and aircraft registration number with explanations in the following categories - airborne equipment faults, ground facility difficulties, aborts of approaches because of ATC instructions, or other reasons.
  - (3) Notify the ECAA as soon as possible of any system failures or abnormalities which require cockpit crew intervention after passing 100 feet during operations in weather conditions below Category I minima.
- (b) For an Extended Period.
- (1) The operator should provide to the ECAA an annual summary of the total number of approaches in weather conditions below Category II minima on which Category IIIa or Category IIIb procedures were used, listed by airport and aircraft type and the number of aborted approaches due to equipment failures or ATC.
  - (2) The operator is to notify the ECAA as soon as possible of any system failures or abnormalities which require cockpit crew intervention after passing 100 feet during operations in weather conditions below Category I minima.

#### **EAC91-12.23 Approval Process**

- (a) Operators should submit an application to the FSSS that contains information in the form and manner prescribed by the ECAA. Each operator must submit his application at least 30 days before the date of intended operation along with the following:
- (1) Eligibility Airworthiness Documents: Sufficient documentation should be available to establish that the aircraft has an appropriate AFM, AFM Supplement (AFMS), if applicable, and is otherwise suitably qualified for CAT III operations.
  - (2) Description of Aircraft Equipment to be used for CAT III operations.
  - (3) Operational Training Programs and Operating Practices and Procedures.

- (4) Operational Manuals and Checklists.
  - (5) Operating history that identifies relevant past problems and incidents, if any, and actions taken to correct the situation.
  - (6) Minimum Equipment List (MEL) relevant updates
  - (7) Maintenance program relevant updates
- (b) System evaluation.  
It should be approved from the manufacturer to conform with FAA AC120-28C standards or equivalent.
- (c) Each Aircraft type that an operator intends to use in for CAT III operations must receive airworthiness approval prior to the operational approval being granted.
- (d) Equipment approval criteria.  
Airborne navigation instrument and/or flight control equipment may be eligible for installation approval as part of an installed system when it is:
- (1) Found to comply with the requirements of an applicable technical standard order or.
  - (2) Approved as part of an airplane under a type certificate or supplemental type certificate. or
  - (3) Found to comply with other pertinent specifications approved by the ECAA; such as, military standards or a foreign government's standards.