UNSTABLE APPROACHES
AIR TRAFFIC CONTROL CONSIDERATIONS

AIR SAFETY CIRCULAR

VERSION	**:**	**2.0**
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OFFICE OF PRIME INTEREST	**:**	**Airspace & Air Navigation Standards - DAAR**

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TYPE OF DOCUMENT	AIR SAFETY CIRCULAR (ASC).		
STATUS OF DOCUMENT	CONTROLLED		

A. PURPOSE:

A1. This revised Air Safety Circular (ASC) is issued for the purpose of:

A1.1 Describing the factors related to Air Traffic Control actions which may contribute to an unstable approach.

A1.2 Providing Guidance to Managers, Instructors of Air Navigation Service Providers (ANSPs) for implementing the proactive approach to avoid unstable approach.

A1.3 Emphasizing Air Traffic Controllers (ATCs) to ensure strict compliance with ICAO Standards And Recommended Practices (SARPs)

A1.4 Highlighting the importance ATC judgement / decision for issuing ***Go Around instruction.*** .

B. SCOPE:

B1. This Air Safety Circular is applicable to all ANSPs responsible for the management / provision of Aerodrome, Approach, Area Control Services.

C. DESCRIPTION:

C1. **BACKGROUND:**

C1.1 Every day, there are over 100,000 landings occurring on runways at airports worldwide. Despite improvements in safety of operations, there remains a risk of an approach and landing accident. A stable approach means that the aircraft will arrive at the runway in the correct configuration, at the correct speed and power setting and on the correct lateral and vertical path. An unstable approach is where one or more of these parameters are incorrect, and as a result carries an increased risk of an approach and landing incident and/or accident. In addition, an approach which is stable for the final 1,000 feet of the approach affords the pilots the time to fulfil their flying and monitoring duties, maintain situational awareness and preserve mental capacity for any unexpected factors that may occur, during this critical phase of flight. Continuous improvement to stable approach policy compliance, including discontinuation of an unstable approach, will reduce the risk of an accident.

C1.2 South Asia Regional Aviation Safety Team (SARAST) has identified that Runway Excursion leads to more runway accidents than all of other causes combined. There are many factors that may cause a runway excursion including runway contamination, adverse weather conditions, mechanical failure, pilot error and **unstable approaches**.

C1.3 **RUNWAY EXCURSION:**

An event in which an aircraft veers off or overrun the runway surface during either takeoff or landing

C1.4 **UN-STABILIZED APPROACH:**

An **Un-stabilized approach** is an approach during which an aircraft does not maintain at least one of the following variables **stable: speed**, **descent rate, vertical/lateral flight *path and in landing configuration***, or ***receive a landing clearance at certain altitude etc*** which may results in Runway Excursion,

C2. **CURRENT REQUIREMENTS:**

C2.1 Modern turbo-jet and turbo-prop aircraft are designed to have highly efficient low drag aerodynamic characteristics. This helps reduce fuel consumption but does result in such aircraft needing longer distances for descent and deceleration. Aircraft in flight, particularly large aircraft, possess a great deal of energy that must be dissipated appropriately during descent, landing and rollout. Aircraft must meet certain criteria on approach to be able to land safely, and managing an aircraft during the descent and approach phases essentially becomes a task of energy management. Landing long or landing at excessive speeds can result in an over-run and excessive sink rates or failure to capture the correct vertical profile can

contribute to hard landings or Controlled Flight into Terrain (CFIT). In a de-stabilised approach, the rapidly changing and abnormal condition of the aircraft may lead to loss of control.

C2.2 For each performance criterion, such as speed or rate of descent, aircraft must be within a tolerable 'window' in order for it to be classified as 'stabilised' and continue to land. These criteria are assessed as 'gates' which tend to be established depending on individual airline Standard Operating Procedures (SOPs) and flight conditions. Typically operators require the aircraft to be established on the glide path in the landing configuration at the correct speed at a specified height between 1,500 ft and 1000ft above ground level (AGL).

C3. NATIONAL REGULATIONS / INTERNATIONAL REQUIREMENTS FOR ATCS / PILOTS:

C3.1 ICAO emphasis the States, to ensure that Pilots and ATCs shall comply with National Regulations / International Standard and Recommended Practices (SARPs) contained in various Annexes & PANS-DOCs. In this regard, to avoid unstable approach conditions following requirements are highlighted as under:

C3.1.1 Rule-119 (2) of Civil Aviation Rules-1994 (CARs-94) state that:

"The Pilot-in-Command of an aircraft shall be responsible for the operation of the aircraft in accordance with the Rules of the Air and for obeying all instructions of the Air Traffic Services except when compliance with these rules and such instructions would hazard the safety of the operation"

C3.1.2 Rule-120 of CARs-94 requires that "An aircraft shall not be operated or caused to be operated in a negligent or reckless manner so as to endanger life or so as to cause damage to the property of others"

C3.1.3 Rule-144 of CARs-94 requires that the Pilot-in-Command of an aircraft in flight in Pakistan airspace shall comply with such Air Traffic Services instructions in the Aeronautical Information Publication as may be applicable, and with such instructions as may be communicated to him by radio or other means, except when compliance with such instructions would be a hazard to the safety of the aircraft"

C3.1.4 The pilot shall adhered the Air Traffic Control instructions while operating within the Controlled airspace, in this regard Para 4.5.1,3 of ICAO Doc 4444 (PANS-ATM) highlights that "The issuance of Air Traffic Control Clearances by air traffic control units constitutes authority for an aircraft to proceed only in so far as known air traffic is concerned. ATC clearances do not constitute authority to violate any applicable regulations for promoting the safety of flight operations or for any other purpose; neither do clearances relieve a pilot-in-command of any responsibility whatsoever in connection with a possible violation of applicable rules and regulations"

C3.1.5 In describing the responsibilities of Approach control Office, the Para 4.3.3.2 of Doc-4444 (PANS-ATM) state that "A unit providing approach control service shall assume control of arriving aircraft, provided such aircraft have been released to it, upon arrival of the aircraft at the point, level or time agreed for transfer of control, and shall maintain control during approach to the aerodrome."

C4. FACTORS LEADING TO AN UNSTABLE APPROACH:

C4.1 PILOT FACTORS

C4.2 Human error and procedural non-compliance have been identified as primary contributing factors to unstable approaches. Procedural non-compliance may be inadvertent due to an error or a lack of knowledge, or alternatively the result of an intentional violation but in either case represents an undesirable deviation that increases risk. However, there are many other factors, both threats and errors that can contribute to an approach being unstable, including:

a) Loss of situational awareness;

b) Poor visibility and visual illusions;
c) Inadequate recognition of the effect of wind conditions;
d) Adverse weather (e.g. strong or gusty winds, windshear, turbulence, tailwind);
e) Inadequate monitoring by flight crew;
f) Excessive altitude and/or airspeed (inadequate energy management) early in the arrival or approach;
g) Excessive altitude and/or airspeed too close to the threshold;
h) Flight crew fatigue;
i) Commercial pressure to maintain flight schedule;
j) Peer pressure;
k) Failure of automation to capture the glide slope requiring late intervention;
l) Loss of visual references;
m) Premature or late descent caused by failure to positively identify the final approach fix (FAF);
n) Late descent clearance due to traffic;
o) Malfunctioning ground-based navigational aids;
p) Procedures and approaches design;
q) Terrain and obstacles near the airport;
r) Vertical speed or flight path angle;

C4.3 **ATC FACTORS**

Inappropriate Air Traffic Control (ATC) actions can contribute to a stable approach becoming unstable due to the following:

C4.3.1 Distance (Time) provision where insufficient track miles are provided for the flight crew to achieve the correct vertical profile and/or aircraft energy during descent;

C4.3.2 Changes of runway can increase flight deck workload and can significantly affect track mileage to touchdown and may not allow sufficient time for the crew to re-plan the approach;

C4.3.3 Changes in the type of approach particularly from precision to non-precision can affect the planned descent profile. Typically, a non-precision approach requires the aircraft to be stabilised in the landing configuration by the final approach fix. It also requires more preparation and planning by the crew;

C4.3.4 Inappropriate vectoring that does not allow the correct descent profile to be flown in relation to the Instrument Landing System (ILS), and vectoring which causes the aircraft to intercept the glide path before the localiser. Most aircraft will not lock into the glide path in this condition, causing the aircraft to 'fly through' the glide path;

C4.3.5 Incorrect track distance to touchdown resulting in flight crew being unable to calculate their descent and speed profile;

C4.3.6 Inappropriate use of speed control which adversely affects the crew's capability to manage the aircraft's energy and its descent profile.

C4.3.7 ATC misunderstanding of operational characteristics of various aircraft types;

C5. **TIPS FOR ATCOS TO AVOID UNSTABILIZED APPROACH:**

C5.1 *Avoid unexpected shortcuts.* The Unexpected shortcuts may lead to insufficient time and distance remaining to maintain the desired descent profile, and cause the aircraft to be high on the approach. Avoid close-in turns to final.

C5.2 *When aircraft are being vectored, issue track miles to the airport* or approach fix in a timely manner, as appropriate.

C5.3 *Keep the pilot informed regarding runway assignment*, type of approach and descent/speed restrictions. That will allow for proper planning and execution of the approach. Stable approaches require predictability and planning. Avoid last minute changes and advise the pilot as early as possible when changes are anticipated.

C5.4 *Ensure the runway assignment is appropriate for the wind*. Wet or contaminated runways, combined with cross/tail winds are often associated with runway excursions.

C5.5 *Issue accurate and timely information related to changing weather*, wind and Airport / runway conditions.

C5.6 *Apply appropriate speed control / restriction*s. Assigning unrealistic speeds (too fast or slow) may lead to unstable approaches.

C5.7 *Give preference to precision or RNAV (GNSS) approaches* over non-precision approaches. Precision or RNAV (GNSS) approaches have vertical guidance which assists the pilot in maintaining the proper descent profile, resulting in stable approaches.

C5.8 *Avoid instructions that combine a descent clearance and a speed reduction*. Many aircraft can't descend and slow down simultaneously.

C5.9 *Comply with operational flight requirements* related to capturing the glide slope from below. Vectoring for an approach that places an aircraft on the final approach course above the glide slope is a leading cause of unstable approaches.

C5.10 *Avoid close-in, last second runway changes, even to a parallel runway*. To comply with the company's operational procedures and requirements, the flight crew must have time to properly brief the approach and missed approach procedure to the runway being utilised. Even though a pilot may accept a runway change, the result may be an unstable approach.

C6. A VITAL TOOL TO AVOID UNSTABLE APPROACHES

CONTINUOUS DESCENT OPERATIONS (CDO):

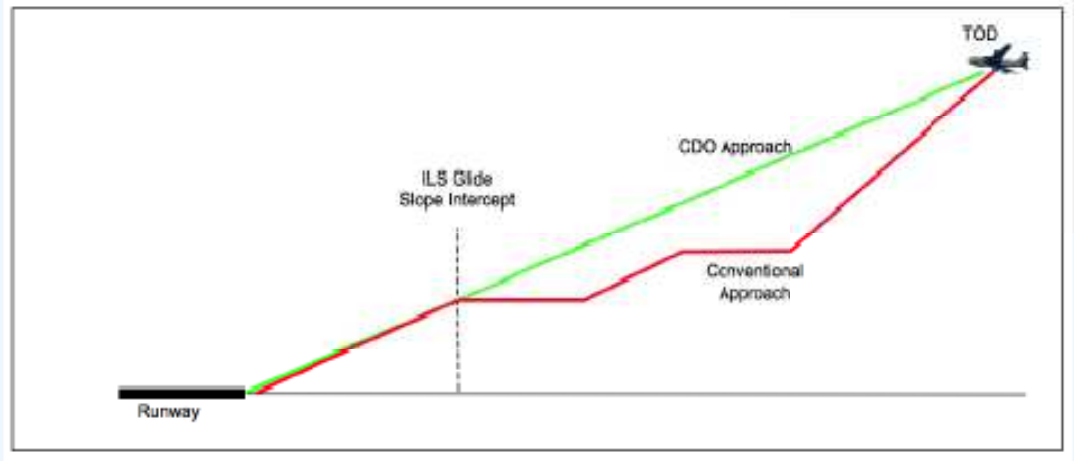
C6.1 In order to reduce chances of Un-stabilized Approach the ATC may refer the guidance material provided in ICAO Document 9931 Continuous Descent Operations (CDO) Manual. In order to ensure effective implementation of CDO techniques following points are highlighted as under;

C6.1.1 The term CDO is used to describe the various methods being used around the world to maximise operational efficiency during arrivals, whilst taking into account any localised issues such as airspace constraints or procedures.

C6.1.2 CDO is a technique available to ANSPs and aircraft operators that helps to increase both safety (through increased flight stability) and airspace capacity (through flight predictability), whilst reducing noise, fuel burn, emissions and pilot-controller communications.

C6.2 An ideal CDO starts from the top of descent (TOD) point in the cruise phase of flight, allowing the aircraft a continuous descent profile, with minimum engine thrust settings, in (where possible) a low drag configuration, with minimum periods of level flight to the final approach fix / point or where it commences the published instrument approach procedure.

A CDO is shown in Figure below:



C6.3 The noise 'footprint' is reduced because the aircraft remains higher for longer and the engines remain at lower thrust (i.e. no need to spool upto level off). Due to the lower thrust settings, the CDO also results in reduced fuel burn and less green house gas emissions.

C6.4 If the aircraft is being vectored, it is essential that the flight crew ***receive timely and accurate distance from touchdown i***nformation from ATC so that they can calculate their required rate of descent. If the aircraft is following a published arrival procedure, the FMS provides an optimum descent path and also deviation information; however, good airmanship calls for the flight crew to still maintain a mental picture of the descent profile.

C6.5 ATC operational requirements for separation and/or traffic sequencing purposes may mean that it is not always possible to provide the optimal CDO, it may be necessary for ATC to stop a descent and direct level flight for portions of the arrival. However, the aim should be to minimise level offs and maximise CDO to the greatest extent possible, whilst not adversely affecting safety and/or capacity ***(ReferDoc-9931 ' Continuous Descent operations').***

C7. UNSTABLE APPROACH AND GO AROUND DECSION BY PILOT OR ATC

C7.1 WHY GO-AROUND

C7.1.1 If an approach is not stable by a certain height above the ground as specified in the company SOP, the pilot must execute a go-around. It is possible for a pilot to initiate a go-around even after touchdown on the runway, provided that in the judgement of the pilot this can be safely executed, but not after the thrust reversers have been deployed.

C7.1.2 In addition to an unstable or destabilized approach, a go-around can be initiated for a number of reasons, including failure to acquire or loss of the required visual reference for a landing, an unexpected event where a pilot may determine that something is not correct for landing such as a flap gauge or gear indication, wind shear, a runway incursion, a request from ATC, or the determination that the landing cannot be made within the touchdown zone, and whenever the safety of a landing appears to be compromised. Failure to execute a go-around is a leading contributing factor in approach and landing accidents.

C7.1.3 GO AROUND POLICY

C7.1.4 As with the stable approach policy, it is the responsibility of operators to develop and promulgate a clear policy on go-around, which states that a go-around is a normal flight manoeuvre to be initiated whenever a continued approach would not be safe or when the approach does not

meet the stabilized approach criteria. The policy must also state that there will be **no punitive** response from management to a go-around and that conversely any failure to go-around when appropriate will be followed up.

C7.1.5 Reference Para 3.4 of ICAO Doc. 8168 PANS OPS Vol-III states the need for operators to publish a 'go-around policy'. This policy should state that if an approach is not stabilized in accordance with the parameters previously defined by the operator in its operations manual or has become destabilized at any subsequent point during an approach, a go-around is required. Operators should reinforce this policy through training.

C7.1.6 One reason why a go-around is not carried out is a perception that the risk of executing the go-around manoeuvre is higher than continuing the approach. This may be due to unfamiliarity with the go-around manoeuvre outside of simulator training or potentially to bad weather in the vicinity of the missed approach path.

C7.1.7 Pilots should regard the go-around as a normal phase of flight, to be initiated whenever the conditions warrant. Nevertheless, the go-around is like any other phase of flight and has potential safety issues associated with it. Increased training and awareness of the dynamic nature of the go-around manoeuvre are vital to reduce the risk of undesirable outcomes.

C7.1.8 Analysis of accident data indicates that common go-around related safety issues were:

a) Ineffective go-around initiation;

b) Loss of control during the go-around;

c) Failure to fly the required track;

d) ATC failure to maintain separation from other aircraft during the go-around manoeuvre;

e) Significant low level wind shear;

f) Wake turbulence created by the go-around aircraft itself creating a risk for other aircraft.

C7.2 GO-AROUND DECISION BY PILOTS:

C7.2.1 If accidents could have been prevented with a sound go-around decision, the question remains as to why flight crews try to salvage a bad approach rather than abandon it and start again. The proper and timely decision to execute a go around from an unstable approach is an important factor in reducing the risk of unwanted events, such as an accident or incident within the industry.

C7.2.2 The go-around is an exercise in good judgment. The pilots' decision can be impacted by traffic, turbulence, hazards, speed, pilots' experience, peer and company pressure and approach problems. However, the earlier the decision the better it is. Pilots should understand the importance of making a go-around decision if they experience an unstable approach or conditions change during the flare or touchdown up to the point of initiating thrust reverse during the landing rollout.

C7.2.3 Factors affecting the go-around decision extend beyond the flight deck and management should consider:

a) Implementation and operation of a non-punitive policy for go-arounds;

b) Fuel policies which allow pilots to carry additional fuel when they consider it necessary, without undue interference from management;

c) Acceptance of the delay and costs associated with go-arounds;

d) Provision of simulator time for the practice of go-arounds from altitudes other than decision altitude;

e) Requirement for approach briefings to include the conditions in which the approach may be continued and must be discontinued;

f) Use in training of real examples of go-arounds to reaffirm the non-punitive policy.

C7.3 **GO AROUND DECSION BY ATC**

C7.3.1 The Air traffic controllers Shall provide Air Traffic Control Service in accordance with the classification of Airspace, as the Control Zones established / implemented around the Aerodromes are of Airspace classification B & C, hence Approach / Aerodrome controllers are required to exercise complete command & control over the aircraft operating within that control zone.

C7.3.2 In context to surveillance Radar Approaches, the Para 8.9.6.1.8 of ICAO Doc 4444 (PANS-ATM) state that an aircraft making a radar approach should:

a) **be directed to execute a missed approach in the following circumstances**:

i). when the aircraft appears to be dangerously positioned on final approach; or

ii). for reasons involving traffic conflictions; or

iii). if no clearance to land has been received from the procedural controller by the time the aircraft reaches a distance of 4 km (2 NM) from touchdown or such other distance as has been agreed with the aerodrome control tower; or

iv). on instructions by the aerodrome controller; or

b) be advised to consider executing a missed approach in the following circumstances:

i). when the aircraft reaches a position from which it appears that a successful approach cannot be completed; or

ii). if the aircraft is not visible on the situation display for any significant interval during the last 4 km (2 NM) of the approach; or

iii). if the position or identification of the aircraft is in doubt during any portion of the final approach. In all such cases, the reason for the instruction or the advice should be given to the pilot.

C7.3.3 Above requirements for instructing the aircraft to initiate Go Around / missed Approach are described under the scenario of Surveillance Radar Approaches, however it is recommended that the same provisions may be considered vital during normal Approach and / or Aerodrome control Service. In order to enhance safety of the aircraft operation the Approach / Aerodrome Controller should be encouraged for exercising the best judgment for taking such decision. In light of the above recommendation, it is reiterated that ANSP Managers should:

a) Develop Non Punitive policy against ATC for taking such decision and instruct aircraft to initiate GO Around,

b) Include Go Ground Decision making as mandatory aspect of Basic ATC, on the Job and Simulator Trainings,

c) Not Investigate the Go Around initiated by the Pilot due to unstable approach or may be investigate to evaluate safety risk only.

d) Conduct statistical analysis on the Go around incidences, and, organize awareness sessions when circumstances so warrant.

C8. **OTHER RELATED PUBLICATIONS:**

C8.1 A number of non-CAA technical documents exist, that deal with the issues related to unstable approaches. The responsible Training Officers / Instructors of ANSP may refer these documents for ready reference & good to know which may be useful to ensure safe aircraft operation in the region. The list of documents along with website links is highlighted as under:

C8.1.1 Un-stabilized Approach: Inappropriate ATC Speed Instructions, Euro Control Skybrary.

www.skybrary.aero/index.php/Unstabilised_Approach:_Inappropriate_ATC_Speed_Instructions

C8.1.2 Un-stabilized Approach: Delayed Descent Instructions.

www.skybrary.aero/index.php/Unstabilised_Approach:_Delayed_Descent_Instructions

C8.1.3 Un-stabilized Approach: Landing Distance and Final Approach Speed.

www.skybrary.aero/index.php/Unstabilised_Approach:_Landing_Distance_and_Final_Speed_Calculations

C8.1.4 Contribution of Unstable Approaches to aircraft accidents and incidents.

www.skybrary.aero/index.php/Contribution_of_Unstabilised_Approaches_to_Aircraft_Accidents_and_Incidents

C8.1.5 Stabilized Approach, DGAC (France) Good Practice Guide.

www.skybrary.aero/bookshelf/books/537.pdf

C8.1.6 Stabilized Approach:

http://aviationsafetywiki.org/index.php/Stabilised_Approach

C8.1.7 Stabilized Approach. Flight Safety Foundation ALAR Briefing note 7.1.

www.skybrary.aero/bookshelf/books/864.pdf

C8.1.8 Unstable Approaches ATC Considerations, CANSO.

www.canso.org/safety

C9. **COMPLIANCE / ACTION TO BE TAKEN:**

C9.1 All ANSPs providing aerodrome and approach control services are required to ensure that their staff are aware of the safety issues linked to unstable approaches particularly those discussed in this safety circular.

D. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

D1. **ACRONYMS:**

ANSP	:	AIR NAVIGATION SERVICE PROVIDER
ASC	:	AIR SAFETY CIRCULAR
ATC	:	AIR TRAFFIC CONTROL
ATCOS	:	AIR TRAFFIC CONTROL OFFICERS
CDO	:	CONTINUOUS DESCENT OPERATION
CFIT	:	CONTROLLED FLIGHT INTO TERRAIN
FMS	:	FLIGHT MANAGEMENT SYSTEM
GNSS	:	GLOBAL NAVIGATION SATELLITE SYSTEM
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
RNAV	:	AREA NAVIGATION

SARAST : SOUTH ASIAN REGIONAL AVIATION SAFETY TEAM

TOD : TOP OF DESCENT

D2. **RECORDS:**

D2.1 Air Safety Circulars **(File No. HQCAA/1111/112/ARAN/I)**

D3. **REFERENCES:**

D3.1 Guidance Material of Civil Air Navigation Services Organization **(CANSO)**

D3.2 Unstable approaches, Risk mitigation Policies, procedures and Best Practices by International Air Transport Association (IATA) 3rd Edition.

D3.3 Continuous Descent Operation Manual **(ICAO DOC-9931)**

D3.4 Document & Record Control **(CAAO-001-MSXX-2.0)**

D3.5 Security Grading / Classification & Maintenance of Files / Documents **(CAAO-004-HRBS)**

IMPLEMENTATION:

This Air Safety Circular is implemented with immediate effect.

(KHAQAN MURTAZA)
Director General
Pakistan Civil Aviation Authority

Dated: - November, 2021

(ZUBAIR GHAZI)
Director Airspace & Aerodrome Regulations

Dated: - November, 2021
File No. HQCAA/1111/112/ARAN/I