



Regional Aviation Safety Group-Middle East (RASG-MID)

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HARMONISING THE USE & MANAGEMENT OF STOP BARS AT AIRPORTS



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Disclaimer

The content in this document is to provide guidance for aerodrome operators, air traffic service providers and aircraft operators regarding use and operation of Stop Bars. This document has been compiled by members of aviation industry to enhance runway safety. This document is not intended to supersede or replace existing materials produced by the National Regulator or in ICAO SARPs. The distribution or publication of this document does not prejudice the National Regulator's ability to enforce existing national regulation. To the extent of any inconsistency between this document and national/international regulation, standards, recommendations or advisory publications, the content of the national/international regulations, standards, recommendations and advisory publications shall prevail.

1. Introduction

This document serves as a guide for harmonised management of Stop Bars as part of an effective runway safety programme within the MID-Region. Management of Stop Bars include such items as timing, communication, management of outages, etc. Whilst many mature practices exist regarding Stop Bars, these have yet to be formalised and documented as part of a consolidated guidance document.

A runway incursion is defined as “Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft. “ Runway incursions have been the subject of considerable investigative effort for many years and the occurrence of fatal ground collisions at airports has provided an impetus to develop visual and electronic aids for avoiding such incidents. Surrounding runways with a “ring of red Stop Bars” at all entrances to the runways remains one of the most capable concepts developed in order to protect aircraft that are landing and taking off. However, in order for Stop Bars to retain their effectiveness, they must be used in a standard, controlled manner and extinguished whenever a pilot or vehicle driver is allowed access to the runway.

Stop Bars may serve as powerful tools in preventing runway incursions yet the management, rules and procedures regarding Stop Bars vary between airports and various Air Operators (Pilots), Air Navigation Service Providers (Air Traffic Controllers) and Aerodrome Operators (Drivers).

The minimum ICAO requirement for the application of Stop Bars is for runways that are intended to be used with Cat II/III ILS operations i.e. runways with RVR values of less than 550 m. This requirement has led to widespread existence of Stop Bars and many airports have proactively implemented Stop Bar use as a runway safety tool under all operating conditions.

Despite the minimum ICAO requirement, there is still a large degree of discretion on how Stop Bars are managed, specifically as part of a runway safety programme – this includes not only their activation by Air Traffic Control (ATC) controllers but associated procedures for pilots and vehicle drivers.

Stop Bars should be switchable at positions where aircraft and vehicles are expected to cross them and pilots and vehicle drivers should never cross an active Stop Bar. When Stop Bars fail, a contingency procedure must be in place. This contingency assists aircraft and vehicles to cross a Stop Bar that becomes unserviceable and cannot be switched off. This is the only exception to the rule that an active Stop Bar should never be crossed.

2. Background

Further to the actions of the Regional Aviation Safety Group-Middle East (RASG-MID) and its associated RASG-MID Steering Committee, the Regional Aviation Safety Team (MID-RAST) was formed. The MID-RAST was tasked to identify and create implementation plans for a number of focus areas based on information provided by the Aviation Safety Team and the MID-Region Safety Report.

One of the key focus areas under MID-RAST is Runway Safety. This working group is chaired by the United Arab Emirates (UAE) under the direction of Mr Mohammed Al Dossari, Director, Air Navigation & Aerodrome Department, UAE General Civil Aviation Authority.

As part of its Runway Safety Enhancement Initiatives the working group identified the opportunity to publish harmonised guidance material to the MID-Region regarding the management and use of Stop Bars as part of runway safety programme.

The content of this document was originally developed by the UAE's National Runway Safety Team (NRST) as a safety enhancement initiative as part of its National Runway Safety Plan (2014-2016).

Further to analysis of UAE runway safety data, coupled with the top international and regional runway safety priorities, the NRST Study Group identified the need for greater clarity regarding the use and operation of Stop Bars. Management of Stop Bars varies between airports throughout the world including the different airports within a single country. This could potentially compromise safety under certain conditions.

At some airports Stop Bars cannot be switched off by controllers at positions where aircraft and vehicles are expected to cross them. As long as there are airports where pilots are expected to routinely cross active Stop Bars, either with or without a specific instruction from ATC, the danger exists that pilots and drivers will not stop at a Stop Bar. Runway incursions in both normal and low visibility operations have occurred as a result of this. This document is proposed by the Runway Safety Working Group as a definitive action for the MID-Region to prevent such occurrences and to mitigate against tragedies such as those which occurred at Milan Linate and Tenerife airports.



3. Purpose

The purpose of this document is to develop a clear set of guidelines for aerodrome operators, air traffic controllers, drivers and pilots that will resolve ambiguity around the management of Stop Bars and facilitate the implementation of a harmonised use of Stop Bars at airports. References and recommendations have been taken from a combination of ICAO, Eurocontrol and other world best practice.

The aim is to ensure clarity and consistency regarding the operational use of Stop Bars. By accomplishing this, harmonizing the use of Stop Bars then becomes a training issue for pilots, vehicle drivers and controllers. Airport authorities must ensure that Stop Bars are made switchable as required by ICAO and, with the National Regulator oversight and in conjunction with the service providers, develop and implement standard Stop Bar operating and contingency procedures. Having a clear and consistent set of rules in place ensures a standard policy on Stop Bars at every airport and dispels concerns and confusion that may exist.

The guidance material below details operational specifications and guidance for the management and use of Stop Bar systems.

4. Runway Stop Bars and Use

Runway Stop Bars are considered a valuable line of defence against aircraft and vehicles mistakenly entering a runway without ATC clearance. Many Runway Incursion incidents result from pilots and drivers acknowledging runway hold short instructions but then continuing to proceed beyond the runway holding position markings.

Stop Bars are intended to provide additional protection of runway intersections to protect against runway incursions by:

1. Enhancing the visibility of holding points;
2. Reinforcing ATC control of aircraft and vehicles in the vicinity of the runway; and
3. Increasing the defence against ATC error in aircraft or vehicle identification.

Stop Bar operations require no special equipment in aircraft or vehicles but merely require the pilot or driver to stop and hold at a lit Stop Bar and to only proceed when ATC gives the appropriate verbal instruction and switches off the Stop Bar. After an aircraft or vehicle crosses the Stop Bar, all lights are reset automatically or manually by ATC. Where Stop Bars are automatically reset this may be done by a sensor (in the pavement) or a backup timer (the norm is 60 seconds for the timer but this can be varied based on local operating conditions).

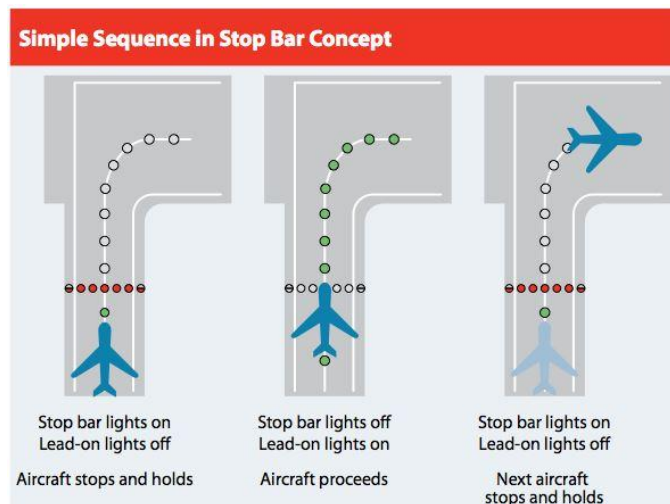


Stop Bars were originally conceived for use during low visibility operations such as Cat II/III ILS approaches. However, some aerodromes operate their Stop Bars permanently as an additional “safety net” to help prevent runway incursions. ICAO Annex 14, Volume I, 5.3.20, Note 2 supports this general notion, however not all aerodromes have adopted this stance and Stop Bar operating policies vary considerably. For instance, at some aerodromes with multiple runways, during periods when Stop Bars are in operation, they are used only for the “active” runway(s) and not for the other “inactive” runway(s), whilst at other aerodromes they are operated for all runways irrespective of operational status.

4.1 What is a runway Stop Bar?

Stop Bars are a series of unidirectional lights embedded in the pavement at right angles to the taxiway centreline at the associated runway holding position. The lights are spaced 3 metres apart across the taxiway and are located at the point where it is desired that traffic stop. This location is normally at the runway holding position lines.

Stop Bars show red in the direction of approach to the Stop Bar from the taxiway and are required to be controlled or operated by ATC. When lit they show where ATC requires that aircraft and vehicles are to stop. Stop Bars must be installed in association with the taxiway centreline lighting beyond the Stop Bar which guides an aircraft onto the runway centreline. Where provided, such lights are operated in conjunction with the Stop Bar so that when the Stop Bar is red, the taxiway centre line lights leading up to the stop bar are lit and the taxiway centre line lights for a minimum distance of 90 m beyond the Stop Bar are unlit. When ATC issues clearance to proceed, the controller turns off the Stop Bar lights and the section of interlocked taxiway lights illuminates showing the taxi route to the runway.



4.2 Stop Bar Operating Period

The periods of Stop Bar operation is mixed throughout the globe. Some aerodromes only operate Stop Bars during low visibility operations (e.g. Cat II/III conditions) whereas others use them during aerodrome operating hours regardless of the weather. Some aerodromes have mixed use, e.g. not in use during Cat I conditions but in use during all operational hours

around dedicated 'Hot Spot' areas irrespective of conditions. This varied use of Stop Bars leads to confusion.

Various organisations have supported the notion of the use of Stop Bars during all periods of aerodrome operation. These include:

ICAO Annex 14, Volume I - 5.3.20

Note 2: "Runway incursions may take place in all visibility or weather conditions. The provision of Stop Bars at runway holding positions and their use at night and in visibility conditions greater than 550 m runway visual range can form part of effective runway incursion prevention measures."

European Action Plan for the Prevention of Runway Incursions (EAPPRI) Edition 2.0

Stop Bars and runway guard lights that protect the runway should be ICAO compliant. Consider using Stop Bars and runway guard lights at all runway/taxiway intersections under all weather conditions (24 hours a day) to help prevent runway incursions.

International Federation of Air Line Pilots' Association (IFALPA) Policy

Stop Bars shall be used 24 hours irrespective of the weather conditions, and irrespective of the status of the runway, be it active or not.

Following extensive trials, **United Kingdom (UK) Civil Aviation Authority (CAA)** encourages 24 hour use (see Civil Aviation Publication (CAP) 168). To date, approximately nine UK aerodromes have adopted this practice.

The clear benefits of this include:

- The runway is protected during all periods of aerodrome operation which is considered a significant safety benefit for pilots, drivers and ATC Operators (ATCOs);
- Stop Bars will be visible in all weather conditions for pilots and drivers; and
- Lit Stop Bars improve runway situational awareness for pilots and drivers.

Where Stop Bars are installed, they should be used during all operational hours regardless of weather conditions.

Note: If Stop Bars are intended to be used during daylight hours or outside low visibility operations and there is no requirement to have the taxiway lighting activated, the taxiway centre line lighting would not need to be interlinked with the activation of the stop bar.

5. Stopping At the Runway Holding Position

The provision of clear and concise taxi instructions by ATC can assist in preventing inadvertent crossing of Runway Holding Positions (RHP). The recommended phraseology for use is extracted from DOC 4444 (detailed taxi instructions):

5.1 Circumstances Phraseologies

TAXI TO HOLDING POINT [number] [RUNWAY (number)] VIA (specific route to be followed) [TIME (time)] [HOLD SHORT OF RUNWAY (number) (or CROSS RUNWAY (number))].

Note: In radiotelephony phraseologies, the expression “holding point” is used to designate the runway-holding position.

The Holding Position designator is at the beginning of the phraseology, which reduces the risk of the clearance limit being “lost” in a clipped transmission. The inclusion of HOLD SHORT in the transmission re-enforces the clearance limit.

Pilots and drivers must comply with the following when Stop Bars are in operation:

- Never cross an illuminated Stop Bar; and
- Only proceed past a Stop Bar when ATC provides the appropriate verbal instruction **AND** switches the Stop Bar lights off.

5.2 ICAO Standards and Recommended Practices

The requirement for a pilot or vehicle driver to stop at an illuminated Stop Bar is clearly given in various ICAO documents.

ICAO Annex 2, Rules of the Air

3.2.2.7.2 An aircraft taxiing on the manoeuvring area shall stop and hold at all runway-holding positions unless otherwise authorized by the aerodrome control tower.

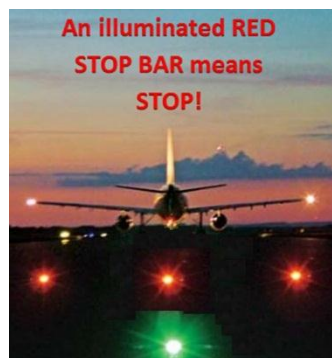
3.2.2.7.3 An aircraft taxiing on the manoeuvring area shall stop and hold at all lighted Stop Bars and may proceed further when the lights are switched off.

ICAO Doc 4444, PANS ATM

Definitions - Runway-holding position: “A designated position intended to protect a runway, an obstacle limitation surface, or an ILS/MLS critical/sensitive area at which taxiing aircraft and vehicles shall stop and hold, unless otherwise authorised by the aerodrome control tower.”

7.15.6 Taxiway lighting: “Note: Taxiway lighting includes such lights as edge lights, centre line lights, Stop Bars and clearance bars. Where required to provide taxi guidance, taxiway lighting shall be turned on in such order that a continuous indication of the taxi path is presented to taxiing aircraft. Taxiway lighting or any portion thereof may be turned off when no longer needed.”

7.15.7 Stop Bars: “Stop Bars shall be switched on to indicate that all traffic shall stop and switched off to indicate that traffic may proceed.”



ICAO Doc 9870

Rec 4.4 (Pilots): “Pilots should never cross illuminated Stop Bars when lining up on, or crossing, a runway...”

Appendix B - Best Practice for Flight Deck: “Red Stop Bars should never be crossed when lining up on or crossing a runway unless, in exceptional circumstances, the Stop Bars, lights or controls are reported to be unserviceable, and contingency measures, such as using Follow-Me Vehicles, are in force...”

Rec 4.5.5 (ATCOs): “Aircraft or vehicles should never be instructed to cross illuminated red Stop Bars when entering or crossing a runway.”

6. Stop Bar Visibility

Stop Bar visibility may be affected if an aircraft rolls right up to the Stop Bar (especially large aircraft). Rolling right up to the Stop Bar or runway holding position lines can impair the crews' ability to see the Stop Bar.

With bigger aircraft, the closer to the holding point line the more difficult the Stop bar lights are to see. If the aircraft sits a little back from the Stop Bar then one or both pilots can sight the Stop Bar lights and confirm Stop Bar activation (switched on or off). Some bigger newer generation aircraft use their nose wheel cameras to sight the Stop Bars.

At some airports such as Dubai International, there is a requirement to taxi right up to the runway holding point to maintain the airport's capacity (line up efficiency) or because there is a lack of taxiway space behind an aircraft on the stub taxiways at the holding point. Dubai Airport has raised Stop Bar lights at each end of the Stop Bar to ensure visibility.

Stop Bar lights may not be clearly visible against the background of taxiway edge, taxiway centre line, runway edge, runway centre line and touchdown zone lighting that makes up the Airfield Ground Lighting (AGL) system, particularly at those aerodromes that have Cat II/III operations.

In these instances, the aerodrome operator may need to consider the installation of additional stop bar lights spaced uniformly within the existing stop bar. LED lighting is also becoming more cost effective and these types of lights have been shown to give a superior luminance and a much sharper and clearer pattern.

3 Metre Spacing (ICAO Standard)



1.5 Metre LED Spacing



7. Stop Bar Contingencies

When a Stop-Bar becomes inoperable and is unable to be switched off, an aircraft may be instructed to cross a lighted Stop Bar. Formal contingency plans must be put in place and should be subject to various minimum conditions depending on the expected time of the failure.

7.1 Short Term Contingency Options

Where the Stop Bar has become unserviceable and aircraft are either holding at the associated holding position or it is not possible to re-route aircraft via an alternate taxiway with a serviceable stop bar the following actions should be considered:

1. The affected runway holding position and the aircraft should be visible to the ATCO. This requirement may be satisfied by the use of a Ground Movement Radar (GMR). When an aerodrome is not GMR equipped, local alternate solutions based on a risk assessment may be employed with the results sent to the National Regulator for approval.
2. The ATCO must give a plausible explanation and give clear, unambiguous and positive clearance to cross the red Stop Bars such as:
"ABC123 line up and wait runway 30R cross the red lights; I say again cross the red lights I am unable to switch the Stop Bar off [as they are unserviceable]"; or
"ABC123 cross the K10 Stop Bar, unable to deselect due unserviceable"
Note 1: The phraseology is to leave the pilot in no doubt that the crossing instruction only applies to the particular inoperable Stop Bar.
Note 2: Conditional clearances shall not be used under these circumstances.
3. If time permits consider the use of a Follow-Me Vehicle to guide aircraft through the lit Stop Bar.
4. Consider putting information on the Automatic Terminal Information Service (ATIS).
5. Additional local ATC procedures may be required where local risk assessments have identified that further mitigation measures may be necessary.

In all cases particular care should be taken if this contingency procedure is to be used in low visibility operations or at night as the green taxiway centreline lights could entice pilots and drivers to enter or cross runways.

7.2 Long Term Contingency Options

Note: For the purpose of this Guidance “Long Term” is considered when Stop Bars are not available and/or switchable for a period such as more than 15 minutes.

1. Where a Stop Bar has failed and there is no alternative routing available or the Stop Bar has failed at a runway entrance, a procedure shall be published either via Notice to Airmen (NOTAM) or promulgated in the Aeronautical Information Publication (AIP) describing under what conditions pilots and drivers may be allowed to cross a lit Stop Bar. Should no such procedure be published the pilots and drivers shall only cross the lit Stop Bar under the direction of a Follow-Me Vehicle when ATC has given an explicit clearance for the Follow-Me Vehicle to lead the aircraft onto/across the runway.
2. When a Follow-Me Vehicle is used, pilots will be required to report the Follow-Me Vehicle in sight to ATC. Thereafter all radio transmissions will be directed to the vehicle until the driver of the Follow-Me Vehicle reports standing down.
3. If the failure is at a particular Controller Work Position (CWP) then transfer control assignment to an alternative CWP and move affected work position to the new CWP.
4. Deselect all runway Stop Bar lights for the affected runway if it is daytime (if control available). If control is not available (total loss of control) then suggest that the airport AGL engineers physically disconnect/mask line-up Stop Bars. If it is night time, low visibility operations or Instrument Meteorological Conditions (IMC) then the affected runway becomes an arrival only runway (nothing is allowed to cross a lit Stop Bar to access the runway) until such a time that full control over safety critical lighting is restored. This scenario could force airports with dual runways to go to single runway operations.
5. If the Stop Bar un-serviceability is going to be for more than six hours then consider issuing a NOTAM.



8. Conditional Clearances

A conditional clearance never includes crossing a Stop Bar. Stop Bars **must** only be deselected by ATC **when the subject traffic has passed**. A conditional clearance does not become effective until a specified condition has been satisfied. ATC, as always, is expected to monitor the situation and to intervene in case the instructions are not complied with (e.g. in case of misunderstanding or delay of action by the flight crew). Where a Stop Bar may take a few seconds to extinguish or 'drop', then a degree of anticipation may be used by ATC.

Aircraft must not cross lit Stop Bars, even if ATC have given a clearance to a point beyond the Stop Bar. Pilots must stop their aircraft and seek clarification from ATC.

Note: The ICAO Conditional Clearance procedure makes no provision for vehicles to be included in the process of receiving a conditional clearance. Therefore, it is recommended that ATCOs should not issue vehicle drivers with conditional clearances.

At airports where there is High Intensity Runway Operations (HIRO), in order to maximise runway capacity, conditional line-up clearances will most likely be used whenever possible. For a 'departure following a departure' in a conditional line up scenario only, the Stop Bar can be deselected to allow the second departure to begin their line up even before the first departure has commenced their roll. To ensure pilots line up expeditiously there are certain provisos for pilots in this case and these include:

- On receipt of a line-up clearance pilots shall ensure, complying with their safety and standard operating procedures, that they are able to line up on the runway as soon as the preceding aircraft has commenced take-off roll.
- Pilots in receipt of a conditional line-up clearance on a preceding departing aircraft (E.g. "ABC123, behind the departing 737, line up runway 30R behind") should remain behind the subject aircraft but may cross the runway holding point (subject to there being no illuminated red Stop Bar) and enter the runway upon receipt of the clearance. There is no requirement for the subject aircraft to have commenced its take-off roll before entering the runway. Pilots must be aware that there may be a blast hazard as the aircraft on the runway applies power.
- Pilots in receipt of a conditional clearance shall not cross an illuminated Stop Bar until it has been deselected by ATC.



As stated, a conditional clearance does not include crossing a red Stop Bar and the Stop Bar shall only be extinguished by ATC when the subject of the condition has passed and it is safe for the aircraft or to enter the runway at that particular entry point at that time. However, the use of a conditional clearance by ATC when Stop Bars are in operation possibly merits a review by the National Regulator.

9. Breakdown of ICAO SARPS regarding Stop Bars

It is vital that the ICAO provisions from various documents (Annex 2, 3.2.2.7.3; and Doc 4444 PANS ATM, 7.15.7) related to runway-holding positions, the operation of Stop Bars and related ATC clearances are read and understood in conjunction with one another and in the proper context. If they are not there is a risk that they could be misinterpreted as authority for pilots to proceed beyond the runway holding points/Stop Bars without an ATC clearance. This is not the situation at all. ICAO Annex 2, 3.2.2.7.3 must be understood in the context of the preceding 3.2.2.7.2 which clearly explains that pilots can proceed beyond the runway holding point only when "...authorised by the aerodrome control tower", i.e. an ATC clearance has been issued.



Additionally, ICAO Annexes and Doc 4444 PANS ATM, 7.15.6 and 7.15.7 are concerned only with the physical operation of the Stop Bars by ATC controllers, and should not be understood as permission for pilots or drivers to proceed beyond the holding point/Stop Bars without an ATC clearance. Observing that a previously lit Stop Bar has been turned off, or that a Stop Bar is not lit, should be interpreted only as a visual confirmation of an ATC clearance to proceed.

The European Action Plan for the Prevention of Runway Incursions (EAPPRI), 1.4.3 states for Air Operators, "Ensure that flight deck procedures contain a requirement for clearances to cross any runway. Includes non-active runways."

"Ensure that Aerodrome Operators and Air Navigation Service Providers regularly review the operational use of aeronautical ground lighting e.g. Stop Bars, to ensure a robust policy to protect the runway from the incorrect presence of traffic."

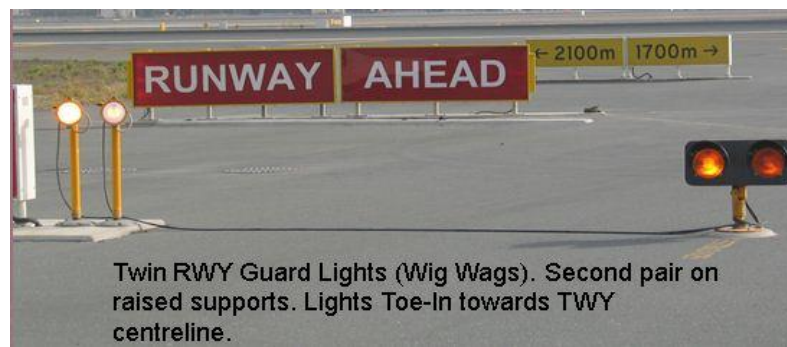
10. Additional Incursion Measures

10.1 Runway Guard Lights

Runway Guard Lights (sometimes referred to as Wig Wags) are often regarded as the first line of defence against unintended runway incursions. They serve to raise situational awareness but do not provide or preclude authority to pass as do red Stop Bars. They consist of a pair of unidirectional yellow lights which flash continuously. They are normally

positioned at each side of a taxiway at the marked and signed Holding Point and location should be according to ICAO Annex 14, 5.3.23.4 and 5.3.23.5. The lights are required to have equal intervals lit and unlit and to flash at between 30 and 60 cycles per minute. Runway Guard Lights must be provided at each taxiway/runway intersection when the runway is intended to be used in RVR less than 550 m and a stop bar is not installed; and where the RVR is between 550 m and 1,200 m and the traffic density is heavy.

There are two configurations of runway guard lights. The most common configuration consists of a pair of normally elevated yellow lights located on either side of the taxiway. The second configuration consists of a row of yellow lights across the taxiway, similar to a stop bar. Runway guard lights are operated independently of the Stop Bars and where the row of lights is used they must not be collocated with the stop bar.



10.2 Runway Ahead Markings and Signs

Runway Ahead markings and signs are becoming more popular as a method of increasing the situational awareness for pilots and drivers. The signs are similar in size to Runway Holding Position signs and are located on the edge of the taxiway prior to the runway/taxiway intersection. Caution must be taken when installing these signs to ensure that they do not interfere with the other required signage in this area.

Runway Ahead markings are painted across the taxiway prior to the holding point. The colour and size is similar to that used for mandatory instruction markings and again they should be located so as to not cause confusion with other required markings.



11. Summary

The use of Stop Bars in a non-harmonized manner creates confusion and could possibly lead to serious incidents and accidents. Unfortunately, the provisions as they exist today in relation to Stop Bar are not always being applied in a consistent manner. Adhering to this guidance document (based on National, ICAO, European and world best practices) for Stop Bars will enhance and help to standardise the management of Stop Bars. It is everyone's

interest to harmonise and use consistent Stop Bar practices at least within our region's aviation industry.

The key means to the successful use of Stop Bars are:

General

- A clear Stop Bar policy by each airport organisation (ANSP and Aerodrome Operator) and aircraft operator which is based on these guidelines;
- Stop bars should be in use during all periods of operation of the aerodrome;
- Where necessary some of these guidelines may be turned into national policies which may be enforced by the National Regulator;
- Never cross (or instruct others to cross) a lit Stop Bar unless contingency measures are in place;
- A clear strategy for the planning and implementation of maintenance or other works on the manoeuvring area;
- Ergonomic design of the HMI interface of the air traffic control lighting panel and Stop Bar switches;
- Independence of the Stop Bars from other air ground lighting (to ensure that all Stop Bars will not fail at the same time as other lights); and
- All airports where Stop Bars are used should develop and implement contingency procedures for use in the event that an aircraft or vehicle is at an active Stop Bar that cannot be switched off.

Pilots & Drivers

- Pilots and vehicle drivers should be trained to never cross an active Stop Bar, except when contingency measures are in place;
- If instructed to cross a red Stop Bar, pilots and drivers should challenge the ATC to switch off the Stop Bar or provide alternative routing. If in doubt query ATC as to the intent of the instruction and at the very least advise ATC that the red lights are still on;
- Should a pilot or driver require clarification on a clearance issued they should stop before the Stop Bar and request clarification from the ATC prior to crossing any holding point. If in Doubt STOP and ask; and
- Pilots and Drivers may only cross a deselected stop bar/holding point when the appropriate voice clearance has been issued by the ATC and read-back by the pilot/driver. Pilots and Drivers should be careful not to assume clearance to cross/enter a runway has been issued if the stop bar is not illuminated.

ATC

- Air traffic controllers should never instruct a pilot or vehicle driver to cross an active Stop Bar except when contingency measures are in place; and

- When issuing a Conditional Clearance, ATC should only extinguish the Stop Bar when the subject of the condition has passed and it is safe for the aircraft or vehicle to enter the runway at that entry point at that time.

12. Recommendations

Air Navigation Service Providers

It is recommended that all air navigation service providers ensure the following:

1. The red Stop Bar light is switched off as the verbal instruction by ATC is given to reinforce that an aircraft or vehicle is cleared to enter the runway. **[SBR-01-ANS]**
2. A conditional clearance does not include crossing a lit Stop Bar and the Stop Bar shall be extinguished by ATC only when the subject of the condition has passed and it is safe for the aircraft or vehicle to enter the runway at that particular entry point at that time. However, the use of a conditional clearance by ATC when Stop Bars are in operation possibly merits a review by the National Regulator. **[SBR-02-ANS]**
3. Support their relevant Local Runway Safety Teams as it is vital that all stakeholders are represented. **[SBR-03-ANS]**

Air Operators

It is recommended that all air operators ensure the following:

1. An aircraft taxiing on the manoeuvring area must stop and hold at all lighted runway Stop Bars. The aircraft may only proceed further when in receipt of a clearance by ATC and the Stop Bar lights have been switched off. **[SBR-04-ANS]**
2. Support their relevant Local Runway Safety Team as it is vital that all stakeholders are represented. **[SBR-05-ANS]**

Aerodrome Operators

It is recommended that all aerodrome operators ensure the following:

1. All vehicles operating on the manoeuvring area must stop and hold at all lighted runway Stop Bars. The vehicle may only proceed further when in receipt of a clearance by ATC and the Stop Bar lights have been switched off. **[SBR-06-ADR]**
2. Where Stop Bars are installed at airports they should be used during all operational periods regardless of weather conditions. **[SBR-07-ADR]**
3. Where Stop Bars are installed they should be used during all operational periods on inactive runways unless other mitigations have been put in place. **[SBR-08-ADR]**
4. The use of LED lights as they give superior luminance. **[SBR-09-ADR]**
5. The installation of additional lights to reduce the spacing of fittings from the standard 3 m to 1.5 m. **[SBR-10-ADR]**
6. Runway Ahead markings and Runway Ahead vertical signs are also considered in addition to Runway designation markings. **[SBR-11-ADR]**

7. Develop an annual programme where senior managers from different departments (Airfield Lighting, ATC and Airport Operational management) review aerodrome visual aids, ground lighting, signs and markings to identify Hot Spot areas. **[SBR-12-ADR]**
8. Ensure Hot Spots are published in the AIP. **[SBR-13-ADR]**
9. Support their Local Runway Safety Team and it is vital that all stakeholders are represented. **[SBR-14-ADR]**
10. A review or evaluation of aerodrome visual aids in conjunction with ATC clearances and instructions is carried out on a regular basis. **[SBR-14-ADR]**

National Regulator

It is recommended the National Regulator should conduct a detailed assessment of world best practice, regulations and the contents/recommendation of this report with the objective of providing more concise regulations and national guidance material. **[SBR-15-REG]**

Appendix A - Reference Material for Stop Bars

ICAO Annex 2, Rules of the Air

ICAO Annex 4, Aeronautical Charts

ICAO Annex 14, Volume I Aerodrome Design and Operations

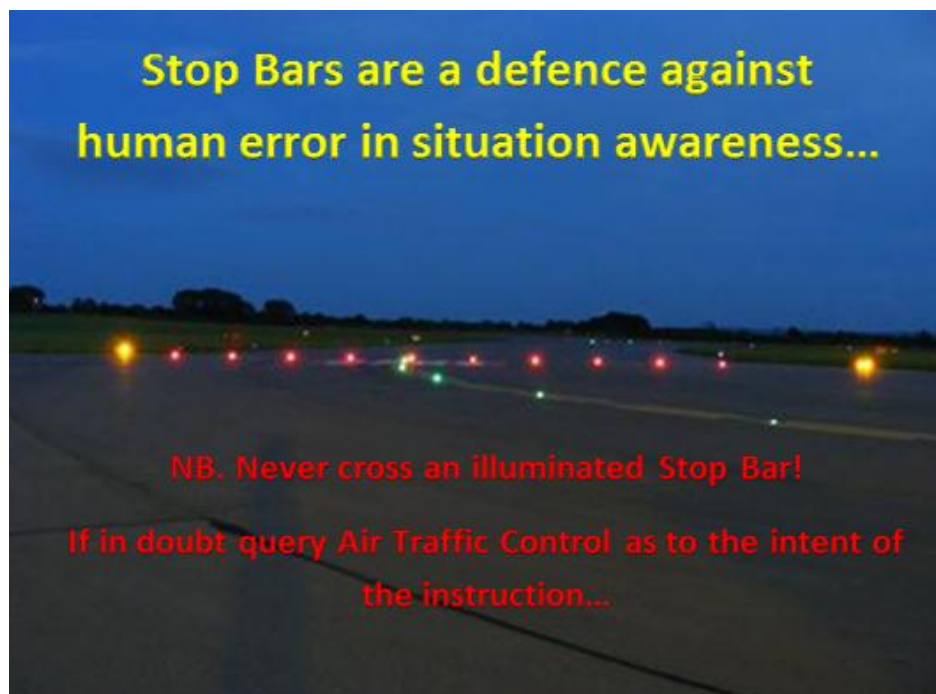
ICAO Annex 15, Aeronautical Information Services

ICAO Doc 4444, Air Traffic Management:

ICAO Doc 9426, Air Traffic Services Planning Manual

ICAO Doc 9870, Manual on the Prevention of Runway Incursions:

European Action Plan for the Prevention of Runway Incursions - Edition 2.0



Appendix B - Use & Management of Stop Bars Compliance Audit

Focus Area	Specific Question	Reference	In place	Partially in Place	Not in Place	Comment / Relevant Document Reference
MANAGEMENT & USE OF STOP BARS						
Runway Safety & Prevention of Runway Incursions To protect the runway	An aircraft taxiing on the maneuvering area shall stop and hold at all runway-holding positions unless otherwise authorized by the aerodrome control tower.	ICAO Annex 2, 3.2.2.7.2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference
	An aircraft taxiing on the maneuvering area shall stop and hold at all lighted Stop Bars and may proceed further when the lights are switched off.	ICAO Annex 2, 3.2.2.7.3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference
	Stop Bars shall be switched on to indicate that all traffic shall stop and switched off to indicate that traffic may proceed.	ICAO Doc 4444, PANS ATM 7.15.7 Stop Bars	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference
	A Stop Bar is switched on to indicate that traffic stop and switched off to indicate that traffic proceed.	ICAO Annex 14, Aerodromes 5.3.19.3 (Note 1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference
	Pilots should never cross illuminated Stop Bars when lining up on, or crossing, a runway...	ICAO Doc 9870 Rec 4.4 (Pilots)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference

Focus Area	Specific Question	Reference	In place	Partially in Place	Not in Place	Comment / Relevant Document Reference
	Red Stop Bars should never be crossed when lining up on or crossing a runway unless, in exceptional circumstances, the Stop Bars, lights or controls are reported to be unserviceable, and contingency measures, such as using Follow-Me Vehicles, are in force...	ICAO Doc 9870 Appendix B - Best Practice for Flight Deck	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference
	Aircraft or vehicles should never be instructed to cross illuminated red Stop Bars when entering or crossing a runway.	ICAO Doc 9870 Rec 4.5.5 (ATCOs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference
Stop Bar Operating Period - Protecting the Runway 24 HOURS - significant safety benefit for pilots, drivers and ATCOs; - Stop Bars visible in all weather conditions for Pilots and Drivers. - Stop Bars on 24 HOURS improves	Runway incursions may take place in all visibility or weather conditions. The provision of Stop Bars at runway holding positions and their use at night and in visibility conditions greater than 550 m runway visual range can form part of effective runway incursion prevention measures.	ICAO Annex 14, Volume I - 5.3.19 - Note 2. UAE CAR Part IX 9.20 - Note 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference
	Stop Bars and runway guard lights that protect the runway should be ICAO compliant. Con-sider using Stop Bars and runway guard lights at all runway / taxiway intersections under all weather conditions (24 hours a day) to help prevent runway incursions.	European Action Plan for the Prevention of Runway Incursions Edition 2.0 EAPPRI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference
	IFALPA policy states that Stop Bars shall be used 24 hours irrespective of the weather conditions, and irrespective of the status of the runway, be it active or not.	IFALPA (International Federation of Air Line Pilots' Associations)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference

Focus Area	Specific Question	Reference	In place	Partially in Place	Not in Place	Comment / Relevant Document Reference
runway situational awareness for Pilots and Drivers.	Following extensive trials, the UK encourages 24 hour use (see CAP 168). To date, approximately 9 UK aerodromes have adopted this practice.	UK CAA CAP 168	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference
Use of Conditional Clearances by ATC	When conditional clearances are used, specific training should be provided to ensure that such clearances are used strictly according to ICAO provisions.	ICAO Doc 9870	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference
	If conditional clearances are used, in accordance with ICAO provisions, ensure a policy and robust procedures are developed and implemented.	European Action Plan for the Prevention of Runway Incursions Edition 2.0 EAPPRI - 1.3 Communications - 1.3.8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference
	The procedure contained in ICAO Doc 4444, 12.2.7 makes no provision for vehicles to be included in the process of receiving a conditional clearance. Vehicles may only be the subject of a conditional clearance.	European Action Plan for the Prevention of Runway Incursions Edition 2.0 EAPPRI - Appendix A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference

Focus Area	Specific Question	Reference	In place	Partially in Place	Not in Place	Comment / Relevant Document Reference
	<p>ICAO Doc 4444, 12.2.7 Conditional phrases, such as “behind landing aircraft” or “after departing aircraft”, shall not be used for movements affecting the active runway(s), except when the aircraft or vehicles concerned are seen by the appropriate controller and pilot. The aircraft or vehicle causing the condition in the clearance issued shall be the first aircraft/vehicle to pass in front of the other aircraft concerned. In all cases a conditional clearance shall be given in the following order and consist of:</p> <p>a) identification; b) the condition; c) the clearance; and d) brief reiteration of the condition.</p>	<p>European Action Plan for the Prevention of Runway Incursions Edition 2.0 EAPPRI - Appendix A - Communications Guidance</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>State where in Local Docs or SOPs and give reference</p>
	<p>Other clearances or instructions, including conditional clearances, shall be read-back or acknowledged in a manner to clearly indicate that they have been understood and will be complied with.</p> <p>The controller shall listen to the read-back to ascertain that the clearance or instruction has been correctly acknowledged by the flight crew and shall take immediate action to correct any discrepancies revealed by the read-back.</p>	<p>European Action Plan for the Prevention of Runway Incursions Edition 2.0 EAPPRI - Appendix A - Communications Guidance</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>State where in Local Docs or SOPs and give reference</p>

Focus Area	Specific Question	Reference	In place	Partially in Place	Not in Place	Comment / Relevant Document Reference
	<p>Contingency</p> <p>The communication used is to leave the maneuvering area driver and / or pilot in no doubt that the crossing instruction applies only to the faulty stop bar. Conditional clearances should not be used.</p>	<p>European Action Plan for the Prevention of Runway Incursions Edition 2.0</p> <p>EAPPRI - Appendix E - Air Traffic Controller Best Practices</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference
	<p>Manage the length of time Stop Bars are extinguished when conditional clearances are in use to avoid the incorrect presence of a second aircraft or other traffic on the runway.</p>	<p>European Action Plan for the Prevention of Runway Incursions Edition 2.0</p> <p>EAPPRI - Appendix K - Aerodrome Design Guidance for the Prevention of Runway Incursions</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference
	<p>3.7.3.1.1 Other clearances or instructions, including conditional clearances, shall be read back or acknowledged in a manner to clearly indicate that they have been understood and will be complied with.</p>	<p>Annex 11, 3.7.3 Read back of clearances & safety related material.</p> <p>Phraseologies for conditional clearances are in ICAO Doc. 9432 and PANS ATM Doc 4444.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	State where in Local Docs or SOPs and give reference



Focus Area	Specific Question	Reference	In place	Partially in Place	Not in Place	Comment / Relevant Document Reference
	<p>1.7.9 If a conditional clearance has been issued in respect of a landing aircraft the stop-bar must not be deselected until the landing aircraft has passed the position at which the vehicle or aircraft will enter the runway. For aircraft departing from the same runway holding position, when a conditional line-up clearance has been issued to a succeeding departing aircraft, the illuminated red stop-bar may remain deselected provided that it will be the next movement on that runway.</p>	<p>UK CAA CAP 413, 1.7</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>State where in Local Docs or SOPs and give reference</p>

Appendix C - LRST Stop Bar Checklist

Local Runway Safety Team Stop Bar Checklist - Recommendations, Best Practices and Self-Audit Questions in order to carry out a gap analysis to ensure that their aerodrome has implemented as many of the Stop Bar recommendations as possible and to the fullest extent.

Question	Actions Carried-out or Required	Status On-going or Completed	Target Date or Date Completed	Responsibility
Do you have a Stop Bar Operating policy?				
Does all Aeronautical Ground Lighting (AGL) related to runway operations comply with ICAO, EAPPRI & national regulations?				
Is all AGL unambiguous in all conditions?				
Are runway guard lights used as per ICAO, EAPPRI & national regulations?				
Are runway guard lights in operation 24 hours a day in all lighting conditions where appropriate?				
In order to use runway guard lights in all lighting conditions, have LED (Light-emitting diode) light fittings been considered?				
Are stop-bar lights used as per ICAO, EAPPRI & national requirements?				
Are stop-bar lights used 24 hours a day in all lighting conditions where appropriate?				
Are the Stop Bars lights installed at reduced spacing to enhance visual conspicuity?				
Is there a maintenance programme to ensure that all Aerodrome Ground Lights remain clearly visible at all times?				

Question	Actions Carried-out or Required	Status On-going or Completed	Target Date or Date Completed	Responsibility
Does your aerodrome use stop bar lights 24 hours a day in all lighting conditions where appropriate? ... or Low Vis and night only?				
Has your aerodrome's policy on the use of red Stop Bars been promulgated to all aerodrome stakeholders?				
Does your aerodrome have a robust procedure for pilots and vehicle drivers regarding NOT crossing illuminated red Stop Bars?				
Does your aerodrome have robust procedures in the event of a stop bar failure? Short term & Long term contingency measures? Entered in AIP?				
Does your aerodrome have a limit on the time a stop bar may be out of service? - NOTAM action?				
Are factors such as Operability/Switch ability; ATCO workload; Integration with other Systems; ASMGCS; Runway lead in lights; "Follow the Green" concept taken into consideration?				
ICAO Annex 14 & national regulation for aerodrome licensing?				

- END -