TOWER TRAFFIC MANAGEMENT

1. Introduction

The aerodrome controller (called TWR controller) has the responsibility of ensuring Air Traffic Control (ATC) Services within a restricted area around the aerodrome. His main task is the management of the active runways and the aerodrome controller circuit.

2. Functions of TWR controller control tower

TWR controllers shall issue information and clearance to aircraft under their control to achieve a safe, orderly and expeditious flow of air traffic on and in the vicinity of a TWR controller with the object of preventing collision between:

- Aircraft flying in the area of responsibility of the control tower, including the TWR controller traffic circuit
- Aircraft operating on the manoeuvring area (ground operation if there is no dedicated ground controller)
- Aircraft landing and taking off
- Vehicles operating on the manoeuvring area (follow me car in IVAO)

TWR controller shall maintain continuous watch on all flight operations on and in the vicinity of the concerned TWR controller as well as on vehicles on the manoeuvring area.

In real life, TWR controller watch shall be maintained by visual observation and augmented in low visibility condition by radar systems.
In IVAO, the situation is inversed as the software IvAc provides a radar system and the visual which can be used using flight simulator software with combination of the IvAi interface.

If there are other TWR controllers within a control zone, traffic at all TWR controllers within such a zone shall be coordinated so that traffic does not conflict.

The function of a TWR controller may be performed by different control or working positions:

- TWR controller, normally responsible for operations on the runway and aircraft flying within the area of responsibility of TWR controller control tower
- Ground controller, normally responsible for operations on the manoeuvring area (taxiway, apron) with the exception of runways
- Clearance delivery position, normally responsible for delivery of start-up and ATC clearance to departing IFR aircraft flights only

Where parallel or near-parallel runways are used for simultaneous operation, individual controllers should be responsible for operation on each of the runways.

See appropriate documentation for parallel runway handling.

2.1. Choice of the active runways and runway-in-use

The TWR controller is responsible for the choice of the active runways. An active runway is considered by the TWR controller to be suitable for use by the type of aircraft expected to land or take off at the TWR controller.

The term “runway in use” shall be used to indicate the runway or runways that are considered by the TWR controller tower to be the most suitable for use by the type of aircraft expected to land or take off at the TWR controller.

Normally an aircraft will land and take off into the wind unless safety, the runway configuration, meteorological conditions and available instrument approach procedures or air traffic conditions determine that a different direction is preferable.

In selecting the runway in use, the TWR controller shall take into consideration the factors:

- Surface winds and direction
- The TWR controller traffic circuit layout
- The length of the runway
- Approach landing aids available
- Noise abatement procedure in use

Choosing an active runway does not imply that this is the only one that can be used without any alternative.

A pilot can refuse a runway offered for noise-preferential reasons for safety concern.

Please consult the runway selection guide published in our IVAO documentation.

In the case of a change in the active runway, the TWR controller shall warn all the adjacent controllers about the runway change and he shall modify his ATIS.

The **TWR** controller can issue take-off and landing clearances for any non-closed runway or on the opposite configuration of an active runway with keeping the needed separation between all aircraft.

When several runways exist, the **TWR** controller can choose several active runways or assign a particular runway for take-offs and another one for landings.

2.2. Noise Abatement criteria

Runways should not be selected for noise abatement purposes for landing operations unless they are equipped with glide path guidance (ILS) or a visual approach slope indicator system for operations in visual meteorological conditions.

Noise abatement shall not be a determining factor in runway nomination under the following conditions:

- If the runway surface conditions are adversely affected (snow, slush, ice, water, mud, oil…)
- For landing in conditions, when the ceiling is lower than 500ft (150m) above the elevation , or the visibility is less than 1900m
- When the approach requires a vertical minimum height greater than 300ft (100m) above TWR controller elevation, and the ceiling is lower than 800ft (240m) or the visibility is less than 3000m
- For take-off when the visibility is less than 1900m
- When wind shear has been reported or forecast or when thunderstorms are expected to affect the approach or departure
- When crosswind component, including gusts, exceeds 15KT (28km/h), or the tailwind component, including gusts, exceeds 5kt (9km/h)

2.3. Weather criteria

The **TWR** controller has to analyse the TAF (Terminal aerodrome controller Forecast) and has to be informed about wind evolution to decide on the runway in use and to avoid changing the chosen configuration during his control.

In case of light wind (lower than 6 KT or even lower than 8 or 10 KT in certain cases) the active runway might be chosen according to other parameters as:

- Presence of a precision approach in only one runway configuration
- Meteorological constraints (other than winds) imposing the choice of the configuration
- Noise abatement constraints
- Operational constraints like night-time restrictions
- Landscape constraints

2.4. Failure of aids and equipment

This point is not applicable in IVAO. Failures of radio navigation aids and visual aids are not simulated in IVAO. If those aids are present and active in the flight simulator of a pilot, this aid shall not be deactivated to simulate a failure.

2.5. Use of radar in TWR controller control service

Read appropriate documentation for this subject.

3. Regulation for tower control

As there is no view of flight deck, the controller shall ensure that instructions and information which require the flight crew to employ visual detection, recognition and observation are phrased in a clear, concise and complete manner.

3.1. Procedure for departing aircraft

Clearances for departing aircraft shall specify, when necessary for the separation of aircraft:

- The direction of take-off and turn after take-off
- The heading or track to be made good before taking up the cleared departure track
- The level to maintain before continuing climb to assigned level
- The time, the point or the rate at which a level change shall be made
- Any necessary manoeuvre consistent with safe operation of the aircraft

At TWR controller where standard instrument departures (SID) have been established, departing aircraft should normally be cleared to follow the appropriate SID.

3.2. Coordination

Where standard clearances (SID) for departing aircraft have been agreed to between all controllers concerned by departures, the **TWR** controller will normally issue the appropriate standard clearance without prior coordination with or approval from the APP controller or ACC.

Note: TWR controller responsibilities can be split between TWR, GND and DEL position.

Prior coordination of clearances should be required only in the event that a variation to the standard clearance or the standardized transfer of control procedures is necessary or desirable for operation reasons.

APP controller shall be kept informed at all times of the sequence in which aircraft will depart as well as the runway to be used.

3.3. Designated positions of aircraft

The following positions of aircraft in the traffic and taxi circuits are the positions where aircraft normally receive TWR controller clearances and instructions.

Where applicable all clearances should be issued without waiting for aircraft to initiate the call.

Aircraft should be watched closely by the TWR controller as they approach these positions so that proper clearances may be issued without delay:

1. Position on apron ready to move after or before pushback
2. Position on taxiway at a runway holding point
3. Position on runway after line-up
4. Position between at the middle of downwind leg to the final leg of the traffic circuit
5. Position on runway after landing
6. Position on apron after vacating the last taxiway

3.4. Traffic on the ground

Please consult the ground management documentation.

3.5. Control of traffic in the traffic circuit

Aircraft in the traffic circuit shall be controlled to provide enough separation specified by regulations except for the cases described below:

- Aircraft in formation with respect to separation from the other aircraft of the formation flight.
- Aircraft operating in different areas or different runways on TWR controller suitable for simultaneous landings or take-offs
- Aircraft operation in special operation procedure in accordance with IVAO special operation rules

Sufficient separation shall be effected between aircraft in flight in the traffic circuit to allow the spacing of arriving and departing aircraft.

Consult the aerodrome controller circuit management for more information.

3.6. Entry of the traffic circuit

The clearance to enter the circuit should be issued to an aircraft approaching the landing area or the circuit legs in function of the traffic inside the circuit.

Depending on the circumstances and traffic conditions, an aircraft may be cleared to join at any position (leg) in the traffic circuit.

An arriving aircraft executing an instrument approach shall normally be cleared to land straight in unless visual manoeuvring to the landing runway is required.

In case of emergency, it may be necessary, in the interest of safety, for an aircraft to enter a traffic circuit and effect a landing without proper authorization.

Controllers should recognize the possibilities of emergency actions and render all assistance possible.

Consult control zone management for more information.

3.7. Order of priority

An aircraft landing or in the final stages of an approach to land shall normally have priority over an aircraft intending to depart from the same or an intersecting runway.

Priority for landing shall be given to:

- Aircraft which face factors affecting the safe operation of the aircraft (emergency, pan, engine failure, shortage of fuel, etc…)
- Hospital aircraft or aircraft carrying any persons who require urgent medical attention
- Aircraft engaged in search and rescue operations
- Other aircraft

3.8. Departure sequence

Departures shall normally be cleared in the order in which they are ready for take-off.

Deviation may be made from this order of priority to facilitate the maximum number of departures with the least average delay.

In order to build an optimal departure sequence, **TWR** controllers should consider the following factors:

- Type of aircraft and their relative performance
- Routes to be followed after take-off
- Minimum departure interval between take-off
- Wake turbulence separation minima
- Aircraft with slot time (CTOT-ATFM requirement)

During normal operation, a departing aircraft shall not be permitted to commence take-off until the preceding departing aircraft has crossed the end of the runway-in-use or has started a turn or until all preceding landing aircraft are clear of the runway-in-use.

TWR controllers shall apply the timed-based wake turbulence separation and longitudinal separation minima.

Take-off clearance may be issued to an aircraft when there is reasonable assurance that the separation will exist when the aircraft commences take-off.

When a departure clearance is required prior to take-off, the take-off clearance shall not be issued until the clearance has been transmitted to and acknowledged by the aircraft concerned.

Take-off clearance shall be issued when the aircraft is ready for take-off and when aircraft approach the departure runway and the traffic situation permits.

To reduce misunderstanding, the take-off clearance shall include the designator of the departure runway.

3.9. Use of immediate take-off clearance

When given the instruction ‘cleared for immediate take-off, the pilot is expected to act as follows:

- At the holding point: taxi immediately on to the runway and begin a rolling take off without stopping the aircraft. If it is not possible to begin taxiing onto the runway at once or if take off performance calculations mean that a standing start is necessary, then **the clearance must be declined**
- If already lined-up on the runway: commence take-off without any delay. If this is not possible for any reason, **the pilot must advise the controller immediately**.

The purpose of issuing clearances for an immediate take-off is usually to improve runway occupancy. This can apply to a runway being used only for take offs or in mixed mode use (for both for take-offs and landings).

A clearance for immediate take-off may be issued to an aircraft before it enters the runway. On acceptance of such clearance the aircraft shall taxi out to the runway and take off in one continuous movement.

Controllers who issue instructions to a departing aircraft to line up and wait in the expectation that the subsequent take-off will be an 'immediate' one are advised to add "be ready for an immediate" to the line-up instruction. This gives the pilot an opportunity to decline the instruction if they anticipate that they may not be able to accept an immediate take off clearance.

3.10. Control of arriving aircraft

During normal operation, a landing aircraft shall not be permitted to cross the runway threshold on its final approach until the preceding departing aircraft has crossed the end of the runway-in-use or has started a turn or until all preceding landing aircraft are clear of the runway-in-use.

In some countries when the local regulation permits it, an aircraft may be cleared to land when there is reasonable assurance that enough separation will exist when the aircraft crosses the runway threshold, provided that a clearance to land shall not be issued until a preceding landing aircraft has crossed the runway threshold.

To reduce the potential for misunderstanding, the landing clearance shall include the designator of the landing runway.

The APP controller is responsible of the creation of approach sequence separation between aircraft. TheTWR controller is responsible to maintain the separation until the runway threshold.

When necessary or desirable in order to expedite traffic, a landing aircraft may be requested to:

- Hold short of an intersecting runway after landing
- Land beyond the touchdown zone of the runway (example: VFR flight on a long runway)
- Vacate the runway at a specified exit taxiway
- Expedite vacating the runway

A heavy class aircraft shall not be requested to land beyond the touchdown zone of a runway.

3.11. Reduced runway separation minima (same runway)

Some countries have specific rules that authorize that a TWR controller can use reduced separation minima on a specific runway after safety studies by appropriate ATS authorities.

All applicable procedures related to the application of reduced runway separation shall be published in the aeronautical publication.

In IVAO, the reduced runway separation minima are not applicable except if your division has published the local air traffic control procedures.

For the purpose of reduced runway separation, aircraft shall be classified as follows:

- Category 1 aircraft: single engine propeller aircraft with a maximum certificated take-off mass of 2000kg or less
- Category 2 aircraft: single engine propeller aircraft with a maximum certificated take-off mass of more than 2000 kg but less than 7000kg + twin-engine propeller aircraft with a maximum certificated take-off mass of less than 7000kg
- Category 3 aircraft: all other aircraft

Reduced runway separation minima **shall not apply between** a departing aircraft and a preceding landing aircraft.

Reduced separation minima shall be subject to the following conditions:

- Wake turbulence separation minima shall be applied at all times
- Visibility shall be at least 5000m
- Ceiling shall not be lower than 1000ft or 300m
- Tailwind component shall not exceed 5kt
- Radar – system that provides the air traffic controller with position information to assist the controller in assessing the distances between aircraft
- Minimum separation continues to exist between two departing aircraft immediately after take-off of the second aircraft
- Traffic information shall be provided to the flight crew of the succeeding aircraft concerned
- The braking action shall not be adversely affected by runway contaminant such as ice, snow slush and water.

The reduced separation shall in no case be less than the following minima:

- For landing aircraft:
  - A succeeding landing category 1 aircraft may cross the runway threshold when the preceding is a category 1 or category 2 which either:
    - Has landed and has passed a point at least 600m from the threshold of the runway, is in motion and will vacate the runway without backtracking or
    - Is airborne and has passed a point at least 600m from the threshold of the runway
  - A succeeding landing category 2 aircraft may cross the runway threshold when the preceding is a category 1 or category 2 which either:
    - Has landed and has passed a point at least 1500m from the threshold of the runway, is in motion and will vacate the runway without backtracking or
    - Is airborne and has passed a point at least 1500m from the threshold of the runway
  - A succeeding landing aircraft may cross the runway threshold when the preceding is a category 3 which either:
    - Has landed and has passed a point at least 2400m from the threshold of the runway, is in motion and will vacate the runway without backtracking or
    - Is airborne and has passed a point at least 2400m from the threshold of the runway
- For departing aircraft:
  - A category 1 aircraft may be cleared for take-off when the preceding departing aircraft category 1 or category 2 aircraft which is airborne and has passed a point at least 600m from the position of the succeeding aircraft
  - A category 2 aircraft may be cleared for take-off when the preceding departing aircraft category 1 or category 2 aircraft which is airborne and has passed a point at least 1500m from the position of the succeeding aircraft
  - An aircraft may be cleared for take-off when the preceding departing aircraft category 3 which is airborne and has passed a point at least 2400m from the position of the succeeding aircraft

3.12. Low visibility procedures

Low visibility shall be initiated by the **TWR** controller when the conditions are in force.

The **TWR** controller shall inform the **APP** controller concerned when procedures for the precision approach category II/III and low visibility operations will be applied and are no longer in force.

Please consult the LVP documentation to get more information about the LVP procedure.

3.13. Aircraft still on runway

If the **TWR controller** is unable to determine, either visually or via a radar surveillance system that a vacating or crossing aircraft has cleared the runway, the aircraft shall be requested to report when it has vacated the runway. The report shall be made when the entire aircraft is beyond the relevant runway-holding position.

3.14. Suspension of visual flight rules operations

All VFR operations on and in the vicinity of a TWR controller may be suspended by any controller in charge of the TWR controller.
The VFR operations should be suspended when weather conditions are below visual meteorological conditions (VMC) minima.

The following procedures shall be observed by the TWR controller whenever VFR operations are suspended:

- Hold all VFR departures
- Recall all local flights operating under VFR or obtain approval for special VFR operations
- Notify the APP controller or ACC as appropriate of the action taken
- Notify all operators, or their designated representatives, of the reason for taking such action

When traffic conditions and the country regulation permit, special VFR flights may be authorized subject to the approval of the unit providing approach control service.

When the ground visibility is not less than 1500m and weather conditions are below VMC minima, special VFR flights may be authorized to:

- Enter a control zone for the purpose of landing
- Take-off and depart from a control zone
- Cross a control zone
- Operate locally within a control zone

Requests for special VFR flight shall be handled individually.

3.15. Traffic information

Information on essential local traffic known to the controller shall be transmitted without delay to departing and arriving aircraft concerned.

Note: Essential traffic is any aircraft, vehicle on or near the runway to be used or traffic in the take-off and climb out area or the final approach area, which constitute a collision hazard to a departing or arriving aircraft.

3.16. Use of radar in TWR controller control service

ATS surveillance systems may be used in the provision of TWR controller control service to perform the following functions:

- Flight path monitoring of aircraft on final approach
- Flight path monitoring of other aircraft in the vicinity of the TWR controller
- Establishing separation between succeeding departing aircraft
- Providing navigation assistance to VFR flights

Special VFR flights shall not be vectored unless special circumstances occur, such as emergencies.

Caution shall be exercised when vectoring VFR flights so as to ensure that the aircraft concerned does not inadvertently enter instrument meteorological conditions.

4. IFR traffic management

For ground operation, please consult the ground management documentation.

4.1. Outbound IFR traffic

Aircraft are managed from the apron to the holding point by the **GND** controller who transfers them to the **TWR** controller.

Prior to take-off aircraft shall be advised of:

- Any significant changes in the surface wind direction and speed, the air temperature, the visibility or the RVR
- Significant meteorological conditions in the take-off and climb-out area except when it is known that the information has already been received by the aircraft

4.1.1. Line-up

Aircraft arriving at the holding point are lined up on the runway for take-off.

A lining-up clearance cannot be issued if:

- Any IFR aircraft is established on final approach track at less than 5 NM to 6NM.
- Any landing clearance has been issued to any aircraft, regardless of its distance from the threshold
- Any take-off clearance has been issued to any aircraft, if the departing aircraft will cross a holding point

If a gain of time is needed, several aircraft can be lined up simultaneously at different holding points on the same runway.

An aircraft can be lined up on the runway without issuing a take-off clearance if:

- The previous traffic has landed, crossed the holding point where the traffic waits and no other traffic is able to use the runway in a short period of time
- A crossing clearance has been issued to another aircraft
- A take-off clearance has been issued to one aircraft and the runway close to the aircraft position is free
- Any take-off clearance has been issued to any aircraft on a nearby parallel runway

The TWR controller should avoid keeping aircraft on the runway and shall invite aircraft to expedite the runway vacation to the nearest taxiway.

4.1.2. Take-off

The take-off clearance can be issued once the runway track and the initial climb trajectory are clear.

The take-off clearance cannot be issued if:

- An aircraft is on the runway in the section usable for take-off until end of runway.
- An aircraft is crossing the runway in the section usable for take-off
- An aircraft is taking off and has not yet overflown the runway endpoint or cleared the runway axis.
- An aircraft is already cleared to land
- An aircraft at a holding point is already cleared for take-off

A touch-and-go or a low pass must be considered as landing or take-off according to the actual position of the aircraft.

After take-off, VFR traffic can be asked to clear the runway axis in an expeditious way.

The controller should respect the separation between take-offs according to the aircraft's performances and wake turbulence category.

If an aircraft is established between 5 and 8 NM from the runway threshold on the final approach track, the controller can give the departing aircraft a clearance for immediate take-off if the pilot has accepted it and if he is actually ready for immediate take-off without delay.

At any time, the controller shall ensure the separation between take-off and landing traffic in order to avoid a go-around of the arriving aircraft as much as possible.

The analysis of approach speeds of all traffic shall be made by the TWR controller and is essential to maintain adequate separations between take-offs and/or landings.

4.1.3. The case of parallel runways

Aircraft approaching the holding point can be lined up on the runway once it clearly appears that:

- The inbound traffic established on final along the parallel runway axis is not going to land on the take-off runway (runway locator error)
- There is not any traffic established on final along the departure runways (besides special cases or bayonet approach procedures)
- The separation with other aircraft established on final is sufficient

In the case of near parallel runways, whose distance is lower than 760 m, or secant runways, the separation rules between take-offs and landings are equal to those applicable in the case of a unique runway. Hence, simultaneous take-offs and landings are forbidden using the two runways.

4.1.4. Take-off operational separations

The minimal operational separation between two take-offs of aircraft belonging to the same wake turbulence category and with similar performances is reached when the preceding aircraft has passed the runway opposite threshold (or the axis is clear in the case of a VFR). Then, the take-off clearance can be issued to the following aircraft.

In practice, the usual separation is 1 minute (when the turbulence categories of aircraft are compatible)

If 2 consecutive aircraft are supposed to fly along the same initial trajectory and the same route, the separation should be increased to 2 minutes minimum and according to the type of aircraft.

The TWR controller must delay the take-off of very fast aircraft behind slow aircraft (for example a Learjet45 behind an ATR72), but can expedite the take-off of a slow aircraft behind a fast one (for example a BAE146 behind an A320).

If the controller is handling multiple departures, he has to separate them according to their wake turbulence category:

Succeeding– aircraft	behind	preceding aircraft	Separation minima
Medium	behind	Heavy	2 minutes
Light	behind	Heavy	2 minutes
Light	behind	Medium	2 minutes
Medium	behind	A380	3 minutes
Light	behind	A380	3 minutes

This table gives basic values for basic usage of one runway. Please consult documentation "SPP_ADC_Wake_separation" in order to have all separation values for different taking-off configurations.

If an aircraft takes off from an intermediate intersection of the runway or from a near parallel runway, the minimal operational separation must be increased by 1 minute.

Succeeding– aircraft	behind	preceding aircraft	Separation minima
Medium	behind	Heavy	3 minutes
Light	behind	Heavy	3 minutes
Light	behind	Medium	3 minutes
Medium	behind	A380	4 minutes
Light	behind	A380	4 minutes

4.1.5. Transfer

Departing traffic and aircraft going around should be transferred soon after taking off to the **DEP** controller, or when the **DEP** controller is non-present, to the **APP** controller or to the **CTR** controller (following this order).

In practice, traffic is transferred around 1000ft AGL and after passing the runway threshold.

The **TWR** controller should wait until the aircraft has started its initial climb and the pilot is in a more comfortable phase of the procedure.

In all cases, the controller should never wait until the limit of his controlled zone to transfer the traffic to the approach.

4.2. Inbound traffic

Prior to entering the traffic circuit or commencing its approach to land, an aircraft should be provided with the following elements of information with the exception of such elements which is known the aircraft has already received:

- The runway to be used
- The surface wind direction and speed, including variations therefrom
- The QNH altimeter settings (or in accordance with local arrangements or requested by the aircraft, the QFE altimeter settings)

Information on local traffic shall be issued in a timely manner in the judgment of the TWR controller; such information is necessary in the interest of safety, or when requested by the aircraft.

4.2.1. Inbound IFR traffic

Except in particular circumstances, the **TWR** controller gets transferred all IFR aircraft established on the final approach track from the **APP** controller.

The TWR controller is not supposed to handle on his frequency more than 3 IFR arrivals on the final approach axis.

Taking into account operational limitations, transfers are performed before the 6 NM from runway threshold, if possible before the descent point (FAF, FAP) or at the latest on the **outer marker** fix (**OM**).

The **APP** controller can make an early transfer, even at 12 NM.

At the commencement of final approach, the following information shall be transmitted to aircraft:

- Significant change of mean headwind component of 10KT (19km/h)
- Significant change of mean tailwind component of 2KT (4km/h)
- Significant change of mean crosswind component of 5KT (9km/h)
- Presence of wind shear and/or turbulence in the final approach area
- Change of the current visibility value or RVR value and their trend

During final approach, the following information shall be transmitted to aircraft without delay:

- Sudden occurrence of hazards (on runway, on approach path …)
- Significant variation in the current surface wind
- Significant changes in runway surface conditions (rain, ice)
- Change in the operational status or required visual or non-visual aids (not applicable in IVAO)
- Change in the RVR value or change in the visibility

4.2.2. IFR Arrivals' separation

The **TWR** controller is responsible to maintain the separation between the IFR arrivals under his control above the minima. It is recommended to carefully check the aircraft speed when flying the final approach segment.

IFR separation should be created by the APP controller.

The TWR controller should not hesitate to issue speed restriction clearances to ensure that separation minima are fulfilled.

Speed restrictions must be expressed in IAS (Indicated Air Speed) using rounded values (160KT, 180KT).

It is recommended to carefully check the aircraft type on approach since the minimum approach speed strongly depends on the aircraft performances (for example, the ATR72 minimum approach speed differs very much from the B747 one!).

The minimum separation between two aircraft on the final approach axis is 3 NM (or the 2,5NM reduced separation when applicable).

The controller has also to separate them or maintain the separation created by the approach controller according to their wake turbulence category when using radar (IvAc):

Succeeding Aircraft	behind	preceding aircraft	Separation minima
Heavy	behind	Heavy	4 NM
Medium	behind	Heavy	5 NM
Light	behind	Heavy	6 NM
Light	behind	Medium	5 NM
Heavy	behind	A380	6 NM
Medium	behind	A380	7 NM
Light	behind	A380	8 NM

Whenever the responsibility for wake turbulence avoidance rests with the pilot-in-command, TWR controllers shall advise aircraft of the expected occurrence of hazards caused by turbulent wake.

This table gives basic values when the TWR controller has radar capabilities.
The separation minima will change to timing based separation when you consider that your position has no radar capabilities.
Please consult wake turbulence documentation in order to have all separation values for different configurations.

To ensure a suitable traffic management, the **TWR** controller should take into account the following parameters:

- Aircraft performances
- Regulatory separation limits
- Integration of VFR flights into the traffic circuit
- Operational restrictions (inverse QFU take-offs requiring special separation rules)
- Meteorological conditions (eventually requiring a LVP approach)
- Constraints from runway backtrack necessity

4.2.3. Visual approach for IFR aircraft

A visual approach clearance for an IFR flight may be requested by the flight crew or initiated by the controller.

Controller shall exercise caution in a visual approach when there is reason to believe that the flight crew concerned is not familiar with the TWR controller and its surrounding terrain.
Controller shall also take into consideration the meteorological conditions when initiating visual approach.

Controller shall ensure separation between an aircraft cleared to execute a visual approach and other arriving and departing aircraft.

If the distance between the aircraft is less than the wake turbulence separation minimum during visual approach, the controller shall issue a caution of possible wake turbulence. The pilot-in-command of the aircraft concerned shall be responsible for ensuring that the spacing from the preceding aircraft is acceptable.

4.2.4. Landing clearance

The landing clearance cannot be issued if:

- The runway is occupied
- An aircraft is crossing the runway
- An aircraft is taking off but it has not yet passed the runway endpoint or the runway axis is not clear
- A previous aircraft is already cleared to land
- An aircraft at the holding point is already cleared for take-off
- An aircraft is cleared to land or to take-off from a runway which crosses the runway concerned

The landing clearance should be issued as soon as the runway has been vacated (as in real life!)

If the runway has not been vacated, the controller asks the pilot to **continue the IFR approach procedure if there is enough distance from threshold**. Therefore, the controller can take the initiative at any time to issue the landing clearance. He should avoid as much as possible to make the pilots call him during the landing phase.

When the separation between aircraft is such that the pilot will not be able to vacate the runway in time (high speed, long braking, separation below 3 NM), the **TWR** controller shall order a go-around to the aircraft, except in case of parallel runways where he might propose a circling approach to land on the parallel runway and avoid going around.

No circling approach procedure on a parallel runway can be proposed to an aircraft established on final at less than 3 NM.

4.2.5. Runway incursion or obstructed runway

In the event the **TWR** controller, after take-off clearance or a landing clearance has been issued, becomes aware of a runway incursion or the imminent occurrence thereof, or the existence of any obstruction on or in close proximity to the runway likely to impair the safety of an aircraft taking off or landing, appropriate action shall be taken as follows:

- Cancel the take-off clearance for a departing aircraft
- Instruct a landing aircraft to execute a go-around or missed approach
- In all cases inform the aircraft of the runway incursion or obstruction and its location to the runway.

4.2.6. Go around

A go-around can be announced at any moment by the pilot.
(Example: non-stabilized approach, runway occupied, wind shear on final, loss of visual reference).

The TWR controller has nothing to say with respect to this decision, the responsibility of which lies with the captain only.

Following the go-around notification, it is recommended to issue an initial climb clearance, previously coordinated with the **APP/DEP** controller in charge of departures and in any case before transferring the aircraft.

If an aircraft is about to reach the runway threshold (2NM final) and the runway is not vacated, the **TWR** controller **must issue a go-around clearance** to this aircraft, unless already notified by the pilot. When the aircraft is going around it should be transferred to the **DEP**/**APP** controller in charge of departures.

4.2.7. Runway crossing and taxi

The taxiways connecting two near parallel runways are handled by the **TWR** controller.

The controller has to issue a runway crossing clearance to each aircraft or issue a hold short clearance if the aircraft cannot clear the runway crossing.
If not cleared, the aircraft must hold short (maintain holding point) and wait for a runway crossing clearance.

To avoid runway incursions the **TWR** controller shall issue a hold short clearance to the aircraft, if the runway crossing is not possible.

When the controller is about to choose between a take-off and a runway crossing, he must necessarily provide suitable traffic information to the concerned aircraft.

In real life runway incursions are feared by pilots because the aircraft safety is threatened at any time. The controller should inform pilots by providing suitable traffic information.
On IVAO, security issues are not enough taken into consideration by pilots who react like they are alone on the platform.

Controllers must use correct phraseology adapted to the situation, and they must check read back all the time. It is essential to prevent problems and conflicts on the network.

4.2.8. Transfer

Once all runways are vacated, the **TWR** controller transfers the traffic to the **GND** controller.

5. VFR traffic handling

For ground operation, please consult the ground management documentation.

5.1. Aerodrome controller zone entry and exit conditions

VFR traffic is normally transferred from the adjacent controller 2 minutes before entering the controlled zone. The adjacent controller may be the **TWR** controller of a near airport (in case of connected controlled zones) or an **APP** controller.

VFR traffic inbound from a non-controlled zone should contact the TWR controller between 1 and 2 minutes before entering the aerodrome controlled zone.

If the aircraft pursues its route over a class C or D airspace the **TWR** controller transfers it to the adjacent controller 2 minutes before exiting the aerodrome controlled zone.

If the aircraft pursues its route over an uncontrolled airspace or below a controlled zone the controller assigns the VFR a non-controlled transponder code and invites the pilot to switch to UNICOM 122.800MHz

The **TWR** controller should indicate the presence of ATCs providing information and alert services above his airspace.

5.2. VFR flight management – Traffic information

For a **TWR** controller, the VFR traffic handling is the most difficult task.

5.2.1. Class E and D airspace

Inside class E & D airspaces, VFR aircraft are separated from IFR aircraft by issuing traffic information to them. SVFR flights are separated from IFR by means of ATC clearances.

When the separation is ensured by traffic information, the VFR aircraft shall maintain the needed separation from all aircraft that he has in sight in order to prevent collisions and to respect the priority order given by the controller.

The minima of separation applicable for IFR aircraft are not applicable where separation using traffic information is applicable.

5.2.2. Class C airspace

Inside class C airspaces, VFR and SVFR flights are separated from IFR by means of ATC clearances. VFR flights are separated from each other by means of traffic information.

In some countries, the VFR can be separated using traffic information in class C airspace.

5.2.3. Class B airspace

Inside class B airspaces, all aircraft are separated from each other by means of ATC clearances.

5.2.4. Class A airspace

All VFR are strictly forbidden into class A airspace.

In particular conditions or areas, some VFR flights may fly in class A airspace. These are only exceptions published on national AIP which can be found all over the world. They shall obtain a special ATC clearance and have to send a detailed flight plan before the flight and this flight plan shall be accepted prior to the flight.

5.2.5. Traffic information

Traffic information has to be mutual and must be provided by ensuring that the pilot has, or is going to have, the concerned traffic in sight in order to anticipate an eventual avoidance procedure.

An explicit pilot confirmation is the only guarantee that the given traffic information is able to provide the needed separation and that longitudinal and vertical separation limits are correctly met.

5.3. Integration into the TWR controller traffic circuit

Any arriving VFR flight must be integrated into the traffic circuit.

Consult the traffic circuit management documentation.

5.3.1. Standard integration

Several legs can be proposed or imposed by the controller to integrate a flight into the VFR traffic circuit:

- Integration from upwind side by crossing over the airport (at least 500ft above the circuit altitude) and joining the downwind leg
- Integration at the downwind leg (early or mid-downwind)
- Semi-direct integration at the base leg
- Direct integration on final (long final if the approach heading is lower than 30° with respect to the runway track orientation)

The position where the VFR aircraft is asked to join the traffic circuit should be chosen according to:

- The trajectory optimization or the easiest integration for the pilot
- The management of all aircraft flying in the traffic circuit (order in the circuit)
- The VFR traffic management with respect to IFR arrivals and departures

There is no predefined solution in order to handle all VFR traffic in all situations. Only the controller's experience on the particular platform and his common sense might ensure the best decision.

Once traffic information is provided if needed, the controller assigns a landing order in the circuit (i.e. "1", "2", "3"…) according to the traffic management he has planned. The pilot must conform to it!

5.3.2. Possible solution of problematic cases

What is to be done when the integration becomes problematic (too many arrivals, too many departures, too much traffic in the circuit…)? In this case, all possible solutions should be envisaged and their limits have to be appreciated.

Here are some possible solutions:

- Extend downwind leg: this is useful when the VFR n°2 has to pass behind one IFR aircraft on final. The controller must pay attention not to extend the VFR aircraft too far since this can make the pilot losing visual contact with the airport, exiting the aerodrome controlled zone or overflying downtown areas which is forbidden at low altitude.
- Delay using 360° loops on downwind: this is a useful solution in a very limited aerodrome controlled zone or short traffic circuits when the downwind cannot be extended. The controller must pay attention to the procedure since it can become dangerous in case of strong crosswind or repeated loops without a visual reference. This procedure can lead the pilot to unintentionally drift close to the runway because of irregular loops.
- Direct a hold over a VFR reporting point: it is a very useful solution when the traffic circuit is very crowded and several IFR flights are arriving or departing. The drawback is that the planned organization of the circuit is jeopardized and the controller has to sequence back all aircraft. Nevertheless, this is a rather secure procedure in case of complex and conflicting situations or when the visual separation between aircraft is hard to maintain. Traffic information is therefore mandatory over VFR reporting points for all aircraft. Altitude clearances to VFR aircraft can also help the controller to avoid holding conflicts.
- Hold touch-and-go and favour full stop landings: this is useful when the traffic circuit is flown by many aircraft at the same time (in practice it applies to more than 4 aircraft in the circuit). It is often easier to first handle full stop landings *and thereafter deal with circuit training procedures*
- Propose a temporary local flight or rerouting to an alternate airport: in the most extreme cases the controller might propose a temporary local flight or definitely reroute the flight to an alternate airport. This solution should be preferred only when VFR aircraft have been holding for a long time and all the other solutions could not solve the situation.

5.4. VFR transit

The **TWR** controller shall ensure ATC service to all VFR flights in transit over class C and D airfields; in E class airspace, control is provided only when it is asked by the VFR pilot.

The **TWR** controller has to issue a transit clearance and ask to report over the controlled zone exit point. The clearance may contain indications on published or unpublished VFR transit routes, required transit altitude, indications on training zones depending on the activity within the area.

During the whole transit phase, the TWR controller shall provide traffic information and alert services to all concerned aircraft.