1.- Operación de aeronaves (anexo 6)

El proposito del Anexo 6 es **lograr la mayor normalización posible en las operaciones de las aeronaves de transporte aéreo internacional**, para alcanzar así el más altos grado de seguridad y eficacia. Y a parte los Estados faciliten el sobrevuelo por sus territorios de las aeronaves comerciales de otros Estados cumpliendo con los criterios operacionales del mismo.

El anexo 6 se divide en tres partes:

Parte I – Transporte aéreo comercial internacional-aviones

Las normas y métodos contenidos en está parte se aplicarán a la operación de aviones por parte de explotadores autorizados a realizar operaciones de transporte aéreo comercial internacional.

Parte II – Aviación general internacional-aviones

Abarca la operación de todos los aviones de la aviación civil internacional, excepto la operaciones de trabajas aéreos (busqueda y salvamentos, fumigación…)

Parte III – Operaciones internacionales-helicópteros

Toda la normativa se aplicará a todos los helicópteros dedicados a operaciones de transporte aéreo comercial internacional o a operaciones de la aviación general internacional, pero estas normas y métodos reomendados no son aplicables a los helicóteros dedicados a trabajos áereos.

2.- Requerimientos operacionales

En este tema vamos a ver todos **los requerimientos operacionales que necesita un avión para volar**. Números de extintores, regulación de horas de trabajo de las tripulaciones, máscarillas de oxígeno mínimas que necesita una aeronave, mínimos en aproximaciones, etc. Al final del post encontraréis el banco de preguntas para estudiar, también lo podéis descargar.

- Una pregunta que sale mucho es los mínimos en un circling dependiendo de la categoría de aeronave. Os dejo la tabla a continuación para memorizarla.

Table 7: Circling — aeroplanes
MDH and minimum visibility vs aeroplane category

	Airplane Category			
	A	B	C	D
MDH (ft)	400	500	600	700
Minimum meteorological visibility (m)	1 500	1 600	2 400	3 600

- Número de extintores que debe de disponer una aeronave dependiendo del número de asientos.

Table 1

MOPSC	Number of extinguishers
7 - 30	1
31 - 60	2
61 - 200	3
201 - 300	4
301 - 400	5
401 - 500	6
501 - 600	7
601 or more	8

- Identificación de los extintores dependiendo del colorde su etiqueta.

black = CO_2
blue = dry powder
cream = foam
green = vapourising liquids
red = water
yellow = wet chemical

- El operador debe de elegir dos aeropuertos alternativos cuando una hora antes y una hora después de la hora estimada de llegada a nuestro destino, de acuerdo al informe meteorológico, nuestro aeródromo estará debajo de mínimos.

- Horas máximas de vuelo de las tripulaciones

EASA AIR OPS
ORO.FTL.210 Flight times and duty periods
(a) The total duty periods to which a crew member may be assigned shall not exceed:
(1) 60 duty hours in any 7 consecutive days;
(2) 110 duty hours in any 14 consecutive days; and
(3) 190 duty hours in any 28 consecutive days, spread as evenly as practicable throughout that period.

(b) The total flight time of the sectors on which an individual crew member is assigned as an operating crew member shall not exceed:
(1) 100 hours of flight time in any 28 consecutive days;
(2) 900 hours of flight time in any calendar year; and
(3) 1 000 hours of flight time in any 12 consecutive calendar months.

(c) Post-flight duty shall count as duty period. The operator shall specify in its operations manual the minimum time period for post-flight duties.

- Categorías de aeronaves

EASA AIR OPS
Regulation (EU) No 965/2012
CAT.OP.MPA.320 Aircraft categories
(a) Aircraft categories shall be based on the indicated airspeed at threshold (V_{AT}) which is equal to the stalling speed (V_{SO}) multiplied by 1.3 or one-g (gravity) stall speed (V_{S1g}) multiplied by 1.23 in the landing configuration at the maximum certified landing mass. If both V_{SO} and V_{S1g} are available, the higher resulting V_{AT} shall be used.
(b) The aircraft categories specified in the table below shall be used.

Table 1

Aircraft categories corresponding to V_{AT} values

Aircraft category	V_{AT}
A	Less than 91 kt
B	From 91 to 120 kt
C	From 121 to 140 kt
D	From 141 to 165 kt
E	From 166 to 210 kt

(ICAO Table I-4-1-2 - Speeds for procedure calculations in knots (kt))

Aircraft Category	V_{AT}	Range of speeds for initial approach	Range of final approach speeds	Maximum speeds for visual manoeuvring (circling)	Maximum speeds for missed approach Intermediate	Maximum speeds for missed approach Final
A	<91	90/150(110*)	70/100	100	100	110
B	91/120	120/180(140*)	85/130	135	130	150
C	121/140	160/240	115/160	180	160	240
D	141/165	185/250	130/185	205	185	265
E	166/210	185/250	155/230	240	230	275
H	N/A	70/120**	60/90***	N/A	90	90
CAT H (PinS)***	N/A	70/120	60/90	N/A	70 or 90	70 or 90

V_{AT} - Speed at threshold based on 1.3 times stall speed V_{so} or 1.23 times stall speed V_{slg} in the landing configuration at maximum certificated landing mass. (Not applicable to helicopters.)

* *Maximum speed for reversal and racetrack procedures.*

** *Maximum speed for reversal and racetrack procedures up to and including 6000 ft is 100 kt, and maximum speed for reversal and racetrack procedures above 6000 ft is 110 kt.*

*** *Helicopter point-in-space procedures based on basic GNSS may be designed using maximum speeds of 120 KIAS for initial and intermediate segments and 90 KIAS on final and missed approach segments, or 90 KIAS for initial and intermediate segments and 70 KIAS on final and missed approach segments based on operational need. Refer to PANS-OPS, Volume II, Part IV, Chapter 1, „Area navigation (RNAV) point-in-space (PinS) approach procedures for helicopters using basic GNSS receivers".*

Note: The V_{AT} speeds given in Column 1 of Table I-4-1-1 are converted exactly from those in this table, since they determine the category of aircraft. The speeds given in the remaining columns are converted and rounded to the nearest multiple of five for operational reasons and from the standpoint of operational safety are considered to be equivalent.

- Mínimos para el aeropuerto alternativo

Table 1, Planning minima	
Destination alternate aerodrome, isolated destination aerodrome, fuel ERA and ERA aerodrome	
Type of Approach	Planning Minima
CAT II and III	CAT I RVR
CAT I	NPA RVR/VIS Ceiling shall be at or above MDH
NPA	NPA RVR/VIS + 1 000 m Ceiling shall be at or above MDH + 200 ft
Circling	Circling

- Está tabla (mínimos dependiendo de la categoría aproximación por instrumentos) es importantísimo memorizarla porque siempre caen direrentes preguntas.

Category	Decision Height (DH)	Runway Visual Range (RVR)
CAT I	DH 200 ft	RVR 550 m (helicopters 500 m)
CAT II	DH 100 ft	RVR 300 m
CAT IIIA	DH 100 ft	RVR 200 m
CAT IIIB	no DH	75 m (ICAO SARPS: 50 m)

- Despegue de baja visibilidad (LVTO) es un despegue con una RVR (range visual runway) menor de 400m pero no menos de 75m.

- Mínima altura de decisión dependiendo de la ayuda

Table 3: System minima	
Facility	**Lowest DH / MDH**
ILS / MLS / GLS	200 ft
GNSS / SBAS (LPV)	200 ft
GNSS (LNAV)	250 ft
GNSS / Baro-VNAV (LNAV / VNAV)	250 ft
LOC with or without DME	250 ft
SRA (terminating at ½ NM)	250 ft
SRA (terminating at 1 NM)	300 ft
SRA (terminating at 2 NM or more)	350 ft
VOR	300 ft
VOR / DME	250 ft
NDB	350 ft
NDB / DME	300 ft
VDF	350 ft

- Requerimientos de oxígeno mínimo **para aviones presurizados**.

Table 1 ***Oxygen minimum requirements for pressurised aeroplanes***	
Supply for	**Duration and cabin pressure altitude**
1. Occupants of flight crew compartment seats on flight crew compartment duty	(a) The entire flying time when the cabin pressure altitude exceeds 13 000 ft. (b) The remainder of the flying time when the cabin pressure altitude exceeds 10 000 ft but does not exceed 13 000 ft, after the initial 30 minutes at these altitudes, but in no case less than: (1) 30 minutes' supply for aeroplanes certified to fly at altitudes not exceeding 25 000 ft; and (2) 2 hours' supply for aeroplanes certified to fly at altitudes of more than 25 000 ft.
2. Required cabin crew members	(a) The entire flying time when the cabin pressure altitude exceeds 13 000 ft, but not less than 30 minutes' supply. (b) The remainder of the flying time when the cabin pressure altitude exceeds 10 000 ft but does not exceed 13 000 ft, after the initial 30 minutes at these altitudes.
3. 100 % of passengers (*)	The entire flying time when the cabin pressure altitude exceeds 15 000 ft, but in no case less than 10 minutes' supply.
4. 30 % of passengers (*)	The entire flying time when the cabin pressure altitude exceeds 14 000 ft but does not exceed 15 000 ft.

- Requerimientos mínimos de oxígeno para aviones **NO-presurizados** para vuelos por encima de los 10.000 ft.

Table 1 ***Oxygen minimum requirements*** ***for non-pressurised aeroplanes***	
Supply for	**Duration and cabin pressure altitude**
1. Occupants of flight crew compartment seats on flight crew compartment duty and crew members assisting flight crew in their duties	The entire flying time at pressure altitudes above 10 000 ft.
2. Required cabin crew members	The entire flying time at pressure altitudes above 13 000 ft and for any period exceeding 30 minutes at pressure altitudes above 10 000 ft but not exceeding 13 000 ft.
3. Additional crew members and 100 % of passengers (*)	The entire flying time at pressure altitudes above 13 000 ft.
4. 10 % of passengers (*)	The entire flying time after 30 minutes at pressure altitudes above 10 000 ft but not exceeding 13 000 ft.
(*) Passenger numbers in Table 1 refer to passengers actually carried on board, including persons younger than 24 months.	

- Aeronave con más de **5700kg MTOW** o **19 aseintos -> obligatorio TACAS**

- Refuelling está completamente **PROHIBIDO** durante el emnbarque y desembarque de pasajeros

- Suelen caer muchas preguntas sobre el suministro de oxígeno mínimo para los ocupantes del cockpit de vuelo en caso de despresurización, así que tener en cuenta lo siguiente:

1) order to maintain a supply throughout the entire flight time where the cabin pressure altitude is greater than 13 000 ft.
2) order to maintain a supply throughout the entire flight time where the cabin pressure altitude is greater than 10 000 ft and smaller than 13 000 ft minus 30 minutes.
3) no case less than 30 minutes for airplanes certified to fly up to 25 000 ft.
4) no case less than 2 hours for airplanes certified to fly at over 25 000 ft.

- Dejo a continuación la política de combustible que tiene que seguir la compañía y las trupulaciones, es una cosa que lógicamente debemos de saber todos pero nunca está de más recordarlo.

(a) Basic procedure

The usable fuel to be on board for departure should be the sum of the following:

(1) Taxi fuel, which should not be less than the amount expected to be used prior to take-off. Local conditions at the departure aerodrome and auxiliary power unit (APU) consumption should be taken into account.

(2) Trip fuel, which should include:
(i) fuel for take-off and climb from aerodrome elevation to initial cruising level/altitude, taking into account the expected departure routing;
(ii) fuel from top of climb to top of descent, including any step climb/descent;
(iii) fuel from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure; and
(iv) fuel for approach and landing at the destination aerodrome.

(3) Contingency fuel, except as provided for in (b), which should be the higher of:
(i) Either:
(A) 5 % of the planned trip fuel or, in the event of in-flight replanning, 5 % of the trip fuel for the remainder of the flight;
(B) not less than 3 % of the planned trip fuel or, in the event of inflight replanning, 3 % of the trip fuel for the remainder of the flight, provided that an en-route alternate (ERA) aerodrome is available;
(C) an amount of fuel sufficient for 20 minutes flying time based upon the planned trip fuel consumption, provided that the operator has established a fuel consumption monitoring programme for individual aeroplanes and uses valid data determined by means of such a programme for fuel calculation; or
(D) an amount of fuel based on a statistical method that ensures an appropriate statistical coverage of the deviation from the planned to the actual trip fuel. This method is used to monitor the fuel consumption on each city pair/aeroplane combination and the operator uses this data for a statistical analysis to calculate contingency fuel for that city pair/aeroplane combination;
(ii) or an amount to fly for 5 minutes at holding speed at 1 500 ft (450 m), above the destination aerodrome in standard conditions.

(4) Alternate fuel, which should:
(i) include:
(A) fuel for a missed approach from the applicable DA/H or MDA/H at the destination aerodrome to missed approach altitude, taking into account the complete missed approach procedure;
(B) fuel for climb from missed approach altitude to cruising level/altitude, taking into account the expected departure routing;
(C) fuel for cruise from top of climb to top of descent, taking into account the expected routing;
(D) fuel for descent from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure; and
(E) fuel for executing an approach and landing at the destination alternate aerodrome;
(ii) where two destination alternate aerodromes are required, be sufficient to proceed to the alternate aerodrome that requires the greater amount of alternate fuel.

(5) Final reserve fuel, which should be:
(i) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes; or
(ii) for aeroplanes with turbine engines, fuel to fly for 30 minutes at holding speed at 1 500 ft (450 m) above aerodrome elevation in standard conditions, calculated with the estimated mass on arrival at the destination alternate aerodrome or the destination aerodrome, when no destination alternate aerodrome is required.

(6) The minimum additional fuel, which should permit:
(i) the aeroplane to descend as necessary and proceed to an adequate alternate aerodrome in the event of engine failure or loss of pressurisation, whichever requires the greater amount of fuel based on the assumption that such a failure occurs at the most critical point along the route, and
(A) hold there for 15 minutes at 1 500 ft (450 m) above aerodrome elevation in standard conditions; and
(B) make an approach and landing, except that additional fuel is only required if the minimum amount of fuel calculated in accordance with (a)(2) to (a)(5) is not sufficient for such an event; and
(ii) holding for 15 minutes at 1 500 ft (450 m) above destination aerodrome elevation in standard conditions, when a flight is operated without a destination alternate aerodrome.

(b) Reduced contingency fuel (RCF) procedure

If the operator's fuel policy includes pre-flight planning to a destination 1 aerodrome (commercial destination) with an RCF procedure using a decision point along the route and a destination 2 aerodrome (optional refuel destination), the amount of usable fuel, on board for departure, should be the greater of (b)(1) or (b)(2):

(1) The sum of:
(i) taxi fuel;
(ii) trip fuel to the destination 1 aerodrome, via the decision point;
(iii) contingency fuel equal to not less than 5 % of the estimated fuel consumption from the decision point to the destination 1 aerodrome;
(iv) alternate fuel or no alternate fuel if the decision point is at less than 6 hours from the destination 1 aerodrome and the requirements of CAT.OP.MPA.180(b)(2), are fulfilled;
(v) final reserve fuel;
(vi) additional fuel; and
(vii) extra fuel if required by the commander.

(2) The sum of:
(i) taxi fuel;
(ii) trip fuel to the destination 2 aerodrome, via the decision point;
(iii) contingency fuel equal to not less than the amount calculated in accordance with (a)(3) above from departure aerodrome to the destination 2 aerodrome;
(iv) alternate fuel, if a destination 2 alternate aerodrome is required;
(v) final reserve fuel;
(vi) additional fuel; and
(vii) extra fuel if required by the commander.

(d) Isolated aerodrome procedure

If the operator's fuel policy includes planning to an isolated aerodrome, the last possible point of diversion to any available en-route alternate (ERA) aerodrome should be used as the predetermined point.

- Megáfonos obligatorios

Table 1 Number of megaphones	
Passenger seating configuration	**Number of megaphones**
61 to 99	1
100 or more	2

- Máximas distancias sobre aeródromos **en operaciones NO ETOPS**

EASA AIR OPS
Regulation (EU) No 965/2012
CAT.OP.MPA.140 Maximum distance from an adequate aerodrome for two-engined aeroplanes without an ETOPS approval
(a) Unless approved by the competent authority in accordance with Annex V (Part-SPA), Subpart F, the operator shall not operate a two-engined aeroplane over a route that contains a point further from an adequate aerodrome, under standard conditions in still air, than:

(1) for performance class A aeroplanes with either:
(i) a maximum operational passenger seating configuration (MOPSC) of 20 or more; or
(ii) a maximum take-off mass of 45 360 kg or more,
the distance flown in 60 minutes at the one-engine-inoperative (OEI) cruising speed determined in accordance with (b);

(2) for performance class A aeroplanes with:
(i) an MOPSC of 19 or less; and
(ii) a maximum take-off mass less than 45 360 kg,
the distance flown in 120 minutes or, subject to approval by the competent authority, up to 180 minutes for turbo-jet aeroplanes, at the OEI cruise speed determined in accordance with (b);

(3) for performance class B or C aeroplanes:
(i) the distance flown in 120 minutes at the OEI cruise speed determined in accordance with (b); or
(ii) 300 NM, whichever is less.

(b) The operator shall determine a speed for the calculation of the maximum distance to an adequate aerodrome for each two-engined aeroplane type or variant operated, not exceeding V_{MO} (maximum operating speed) based upon the true airspeed that the aeroplane can maintain with one engine inoperative.

3.-Vuelos de larga distancia (Procedimientos operacionales)

- La abreviación **MNPS** significa **Minumun Navigation Performance Specification** (ejem: North Atlantic MNPS Airspace) y se refiere a un espacio aéreo específico donde la precisión en la navegación tiene que ser mayor debido a la gran densidad de tráfico aéreo y la falta de ayudas a la navegación. Las regulaciones sobre como operar en este espacio aéreo pueden ser encontradas en NAT MNPSA operations manual, ICAO Doc.4444 e ICAO Doc.7030.

- El espeacio aéreo MNPS (**Minimum Navigation Performance specification**) se extiende verticalmente entre los niveles de vuelo **FL285** y **FL420**.

- Los horarios a los cuales se puede volar en espacio aéreo MNPS, es una pregunta que sale mucho, por consiguiente memorizarlo.

Day time OTS: 1130 UTC to 1900 UTC at 30°W
Night time OTS: 0100 UTC to 0800 UTC at 30°W

- En espacio aéreo MNPS hay que reportar cada 10ºde longitud por debajo de 70ºN y cada 20º por encima de 70ºN

a) 10 degrees of longitude south of 70°N (between 5°W and 65°W); and
b) 20 degrees of longitude north of 70°N (between 10°W and 50°W).

- Os dejo los pasos a seguir en caso de perdida de comunicación en espació aéreo MNPS.

NAT MNPS Operations Manual - loss of MNPS Navigation/FMS capability
10.2.8 The pilot should:
a) immediately notify ATC;
b) make best use of procedures specified above relating to attempting visual sightings and establishing contact on VHF with adjacent aircraft for useful information;
c) keep a special look-out for possible conflicting aircraft, and make maximum use of exterior lights;
d) if no instructions are received from ATC within a reasonable period consider climbing or descending 500 feet, broadcasting action on 121.5 MHz and advising ATC as soon as possible.

Note: this procedure also applies when a single remaining NAV system gives an indication of degradation of performance, or neither system fails completely but the system indications diverge widely and the defective system cannot be determined.

• Astronomic precession = 15°/h × sin Lm *(an old question stated: 15° × h × sin Lm)*
• Transport precession = g × sin Lm
• Conversion angle = g/2 × sin Lm or ½ × dLong × sin(mLat)

Astronomic Precession - Earth Rate - Apparent Wander
The property of a gyroscope is to maintain an absolute fixed direction. But we are on a planet that rotates, so the Gyro North will have an apparent rotation that is called astronomic precession, because it is due to the Earth rotation. It is also called Earth rate or apparent wander. In fact the Gyro North doesn't move, but the planet does! And since the Earth never stops rotating, astronomic precession exists all the time.

In the northern hemisphere, the meridians are converging to the North Pole, so astronomic precession causes the gyro axis to spin to the right in respect to True North. Inversely, in the southern hemisphere, the meridians are diverging to the North Pole, so the effect is reverse: the gyro axis will spin to the left. The formula expressing the astronomic precession reads: 15°/h × sin average latitude.

On the picture, you can see the apparent wander due to Earth rotation in the northern hemisphere. In the southern hemisphere, the effect is inverted because the meridians are diverging, and not converging, to the North Pole.

Transport Precession
Transport precession is the amount of transport wander. During the travel, the Gyro North doesn't change its direction (assuming precessions are negligible). Since the meridians all converge to the True North, this travel creates a transport precession (see also attached figure).

Conversion Angle
Conversion angle is the angle between the Great Circle and Rhumb Line tracks between two places (see also attached figures). The Rhumb Line and Great Circle tracks between two points will always be different (except for positions on meridians or along the Equator). The Great Circle track will change direction continuously and the Rhumb Line track will always be a constant direction by definition. It can be seen by drawing that the Great Circle track will always lie closer to the Pole and the Rhumb Line closer to the Equator. Value of Conversion Angle (ca) = ½ convergency (C). As conversion angle is one half of convergency, the formula can be written as:

- Veréis los procedimientos especiales a llevar a cabo en MNPS en caso de tener alguna emergencia o fallo de comunicaciones. Suelen caer muchas preguntas de este apartado.

NAT MNPS Operations Manual
Chapter 11: Special Procedures for In-Flight Contingencies

11.1 INTRODUCTION
11.1.1 The following procedures are intended for guidance only. Although all possible contingencies cannot be covered, they provide for such cases as:

a) inability to maintain assigned level due to weather (for example severe turbulence);
b) aircraft performance problems; or
c) pressurisation failure.

11.1.2 They are applicable primarily when rapid descent, turn-back, or diversion to an alternate aerodrome is required. The pilot's judgement will determine the specific sequence of actions taken, having regard to the prevailing circumstances.

11.2 GENERAL PROCEDURES
11.2.1 If an aircraft is unable to continue its flight in accordance with its ATC clearance, a revised clearance should be obtained whenever possible, prior to initiating any action, using the radio telephony distress (MAYDAY) signal or urgency (PAN PAN) signal as appropriate.

11.2.2 If prior clearance cannot be obtained, an ATC clearance should be obtained at the earliest possible time and, in the meantime, the aircraft should broadcast its position (including the ATS Route designator or the Track Code as appropriate) and its intentions, at frequent intervals on 121.5 MHz (with 123.45 MHz as a back-up frequency). It must be recognised that due to the use of SELCAL with HF communications in North Atlantic operations, pilots' situation awareness, of other potentially conflicting traffic, may be non-existent or incomplete. If the aircraft is in an area where ATC communications are being conducted on VHF, pending receipt of any reclearance, the position and intentions should be broadcast on the current control frequency, rather than 123.45 MHz.

11.2.3 Until a revised clearance is obtained the specified NAT in-flight contingency procedures should be carefully followed.

11.2.4 In general terms, the aircraft should be flown at a flight level and/or on a track where other aircraft are least likely to be encountered. Maximum use of aircraft lighting should be made and a good look-out maintained. If TCAS is carried, the displayed information should be used to assist in sighting proximate traffic.

11.3 SPECIAL PROCEDURES
11.3.1 The general concept of these Oceanic in-flight contingency procedures is, whenever operationally feasible, to offset from the assigned route by 15 NM and climb or descend to a level which differs from those normally used by 500 ft if below FL410 or by 1000 ft if above FL410.

Initial Action
11.3.2 The aircraft should leave its assigned route or track by initially turning at least 45° to the right or left whenever this is feasible. The direction of the turn should, where appropriate, be determined by the position of the aircraft relative to any organised route or track system (e.g. whether the aircraft is outside, at the edge of, or within the system). Other factors which may affect the direction of turn are: direction to an alternate airport, terrain clearance, levels allocated on adjacent routes or tracks and any known SLOP off sets adopted by other nearby traffic.

Subsequent Action
11.3.3 An aircraft that is able to maintain its assigned flight level, after deviating 10 NM from its original cleared track centreline and therefore clear of any potentially conflicting traffic above or below following the same track, should :

a) climb or descend 1000 ft if above FL410
b) climb or descend 500 ft when below FL410
c) climb 1000 ft or descend 500 ft if at FL410

Note: PANS ATM (Doc.4444) currently suggests that such climbs or descents be effected after the aircraft is established on the 15 NM offset track, although a further caveat advises that the sequence of actions should be determined by the pilots judgement. Given the density of traffic in NAT MNPS airspace, and in particular in the OTS, it is recommended that this caveat should be employed here and these climbs or descents should be completed prior to establishing on the 15 NM offset track.

11.3.4 An aircraft that is unable to maintain its assigned flight level should, whenever possible, initially minimise its rate of descent when leaving its original track centreline and then expedite descent to a feasible flight level which differs from those normally used by 500 ft if below FL410 (or by 1000 ft if above FL410).

11.3.5 Before commencing any diversion across the flow of adjacent traffic, aircraft should, whilst maintaining the 15 NM offset track, expedite climb above or descent below the vast majority of NAT traffic (i.e. to a level above FL410 or below FL285), and then maintain a flight level which differs from those normally used: by 1000 ft if above FL410, or by 500 ft if below FL410. However, if the pilot is unable or unwilling to carry out a major climb or descent, then any diversion should be carried out at a level 500 ft different from those in use within MNPS Airspace, until a new ATC clearance is obtained.

11.3.6 If these contingency procedures are employed by a twin engine aircraft as a result of the shutdown of a power unit or the failure of a primary aircraft system the pilot should advise ATC as soon as practicable of the situation, reminding ATC of the type of aircraft involved and requesting expeditious handling.

- En la «oceanic clearance» se tiene que reportar **ruta, nivel de vuelo** y **Mach Number**.

- Esta es la manera en la que se debe requerir una «oceanic clearance» :

5.1.12 An example of a pilot voice request for Oceanic Clearance is as follows:
"ACA 865 request Oceanic Clearance. Estimating PIKIL at 1131. Request Mach decimal eight zero, Flight Level three five zero, able Flight Level three six zero, second choice Track Charlie".

4.- Manual de operaciones de la aeronave

Vamos a ver lo que es la **MEL**, la **MMEL** y los diferentes apratados en los que se divide el **manual de operaciones** de la aeronave. Como siempre, al final encontraréis el banco de preguntas relacionado con este tema.

- Todos los manuales de operaciones se dividen en cuatro 4 partes de la siguiente manera:

ORO.MLR.101 Operations manual — structure for commercial air transport
Except for operations with single engined propeller-driven aeroplanes with a MOPSC of 5 or single engined non-complex helicopters with a MOPSC of 5, taking off and landing at the same aerodrome or operating site, under VFR by day, and for operations with sailplanes and balloons, the main structure of the OM shall be as follows:
(a) Part A: General/Basic, comprising all non-type-related operational policies, instructions and procedures;
(b) Part B: Aircraft operating matters, comprising all type-related instructions and procedures, taking into account differences between types/classes, variants or individual aircraft used by the operator;
(c) Part C: Commercial air transport operations, comprising route/role/area and aerodrome/operating site instructions and information;
(d) Part D: Training, comprising all training instructions for personnel required for a safe operation.

Part A General / Basic
0 Administration and control of operations manual
1 Organisation and responsibilities
2 Operational control and supervision
3 Management system
4 Crew composition
5 Qualification requirements
6 Crew health precautions
7 Flight time limitations
8 Operating procedures
9 Dangerous goods and weapons
10 Security
11 Handling, notifying and reporting accidents, incidents and occurrences and using the CVR recording
12 Rules of the air
13 Leasing / code-share

Part B Aircraft Operating Matters - Type Related
0 General information and units of measurement
1 Limitations
2 Normal procedures
3 Abnormal and / or emergency procedures
4 Performance
5 Flight planning
6 Mass and balance
7 Loading
8 Configuration deviation list (CDL)
9 Minimum equipment list (MEL)
10 Survival and emergency equipment including oxygen
11 Emergency evacuation procedures
12 Aircraft systems

Part C Route / Role / Area and Aerodrome / Operating Site Instructions and Information

Part D Training

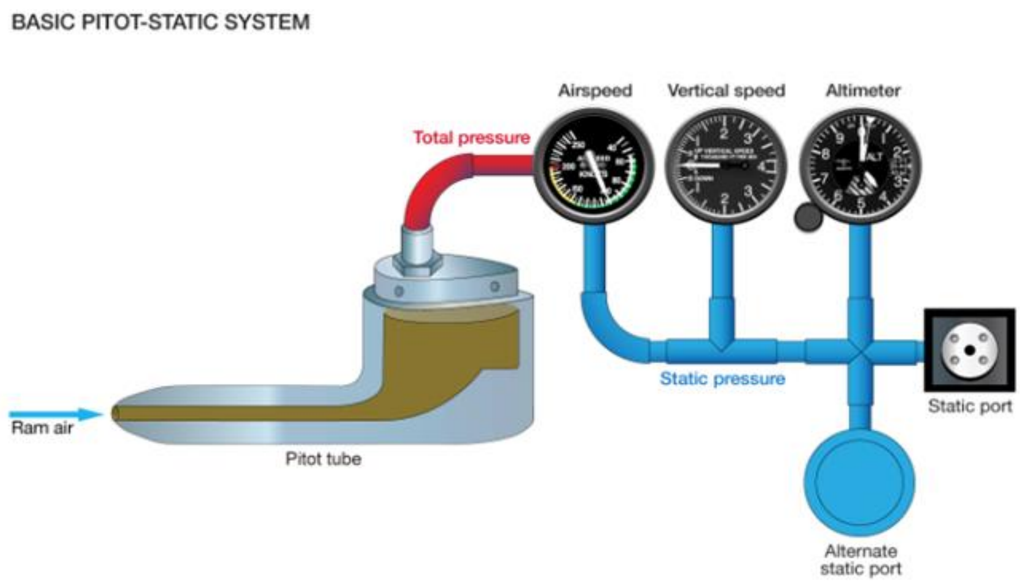
- La **MMEL** significa **Master Minimum Equipment List** es emitida por el fabricante.
- La **MEL** significa **Minimum Equipment List** es emitida por el operador de la aeronave.
- La MEL y la MMEL son usadas por los pilotos para saber si el avión puede volar sin el funcionamiento de ciertos sistemas.

- **SIEMPRE** hay que tener en cuenta que **la MEL es más restricitiva que la MMEL**, lo que quiere decir que el operador de la aeronave puede poner más restricciones de los que pone en la MMEL, una vez adquirida la aeronave al fabricante.

5.- Condiciones de engelamiento

Este tema trata sobre **los procedimientos que se realizan para el deshielo de lo aviones y los productos anti-anticongelantes que se derraman sobre la superficie de las aeronaves en las operaciones invernarles**. Os dejo unos cuantos apuntes sobre la teoría de este tema, y como siempre al final encontraréis el banco de preguntas para estudiar.

- Hay que **tener muy claro este esquema** de como funciona el anemómetro, altímetro y variómetro y como afecta a las indicaciones dependiendo de si se obstruye el tubo pitot o la toma estática porque se pregunta mucho, tanto en la asignatura que estamos viendo de Procimientos Operacionales como la asignatura de Instrumentos.



Effect of blockage on	Airspeed	Altimeter	Vertical speed
Pitot source blocked.	Increases with altitude gain. Decreases with altitude loss.	Correct indication (not affected).	Correct indication (not affected).
Static source blocked.	Decreases with altitude gain. Increases with altitude loss.	Does not change ("freezes").	Returns to zero and does not change ("freezes on 0").
Both sources blocked.	All indications remain constant, regardless of actual changes in airspeed, altitude or vertical speed (all indicators freeze on the values at the time the blockage occurred).		

Blocked pitot tube

A blocked pitot tube is a pitot-static problem that will only affect airspeed indicators. Pitot tube senses a total pressure. A blocked pitot tube will cause the airspeed indicator to incorrectly display an increase in airspeed when the aircraft climbs, even though indicated airspeed is constant. This is caused by the total pressure in the pitot system remaining constant (held constant by the blockage at a value at which the blockage occurred) and at the same time the atmospheric pressure (static pressure) decreasing due to the aircraft climbing => this will produce a greater difference between the total and static pressures, which will be indicated by the airspeed indicator as an increased speed. In reverse, the airspeed indicator will show a decrease in airspeed when the aircraft descends. So, in essence the instrument will begin to function in a similar way to an altimeter. The pitot tube is susceptible to becoming clogged by ice, water, insects or some other obstruction. For this reason, aviation regulatory agencies such as the EASA or FAA recommend that the pitot tube be checked for obstructions prior to any flight. To prevent icing, many pitot tubes are equipped with a heating element. A heated pitot tube is required in all aircraft certificated for instrument flight.

Blocked static port
A blocked static port is a more serious situation because it affects all pitot-static instruments. One of the most common causes of a blocked static port is airframe icing. A blocked static port will cause the altimeter to freeze at a constant value - at the altitude at which the static port became blocked. The vertical speed indicator will gradually return to zero and become frozen at zero - it will not change at all, even if vertical airspeed increases or decreases. The airspeed indicator will reverse the error that occurs with a blocked pitot tube and cause the airspeed be read less than it actually is as the aircraft climbs. When the aircraft is descending, the airspeed will be over-reported. So, in essence the airspeed indicator acts in the reverse of an altimeter. In most aircraft with unpressurized cabins, an alternative static source is available and can be toggled from within the cockpit of the airplane.

Partial blockage of static port
If the static reference system is severely restricted, but not entirely blocked, as the airplane descends, the static reference pressure at the instruments begins to lag behind the actual outside air pressure. While descending, the altimeter may indicate that the airplane is higher than actual because the obstruction slows the airflow from the static port to the altimeter. The vertical speed indicator confirms the altimeter's information regarding rate of change, because the reference pressure is not changing at the same rate as the outside air pressure. The airspeed indicator, unable to tell whether it is experiencing more airspeed pitot pressure or less static reference pressure, indicates a higher airspeed than actual. To the pilot, the instruments indicate that the airplane is too high, too fast, and descending at a rate much less than desired.

- La formación de hielo en las superficies aerodinámicas pueden producir una **reducción en la sustentación de un 30%** y un **aumento en la resistencia de un 40%**.

- Debajo podéis leer una breve explicación sobre **los tipos de fluidos** (tipo I, II, III y IV) para el de-icing y el anti-icing. El tipo I se usa para descongenlación y el II, III y IV como anti-congelante.

Due to their properties, Type I fluids form a thin liquid wetting film, which provides limited holdover time, especially in conditions of freezing precipitation. With this type of fluid no additional holdover time would be provided by increasing the concentration of the fluid in the fluid/water mix.

Type II, III, and IV fluids contain a pseudoplastic thickening agent, which enables the fluid to form a thicker liquid wetting film on external aircraft surfaces. This film provides a longer, but also limited holdover time especially in conditions of freezing precipitation. With this type of fluid additional holdover time will be provided by increasing the concentration of the fluid in the fluid/water mix, with maximum holdover time available from undiluted fluid.

In general, Type I fluids are used primarily for de-icing - e.g. the first step in a 2-step procedure (they are less expensive than type II fluids). They are usually applied diluted by a hot water to increase the de-icing capabilities. A stream of hot Type I fluid is directed to the aircraft to de-ice the surfaces. Heat and pressure will eliminate the snow/ice layer and residues.

Once the aircraft is de-iced, a second step is performed (anti-icing) during which a layer of cold Type II, III or IV fluid is applied to the clean wing surface. As mentioned above, Type II, III and IV fluids are thicker than Type I and provide excellent anti-icing capabilities for prolonged holdover times. The holdover times depend on the type and intensity of precipitation and the concentration of fluid with cold water. During the anti-icing procedure, fluids are applied cold (at ambient temperature) to maintain a thicker consistency and to remain on the treated surface for longer period of time (also to prevent evaporation).

- HOT (Holdover time) : es el tiempo estimado por el cual el fluido anticongelante aplicado sobre la aeronave prevendrá la formación de hielo y la acumulación de nieve, bajo ciertas condiciones meteorológicas. A tener en cuenta que este tiempo se comienza a tomar en cuanto se aplica el fluido anti-congelante.

- El fluido anti-congelante se desprenderá de las alas antes de la rotación. El líquido se tiene que desprender cuando se alcance una velocidad de 80-90 kt y una vez en el aire conectaremos los sistema anti-hielo.

- El líquido descongelante es aplicado caliente mientras el anti-congelante se aplica sin calor

6.- Impacto con aves

Muchos de **los accidentes aéreos son debido al impacto con aves** en las fases de aterrizaje o de despegue, como el famoso accidente en New York donde tuvieron que aterrizar sobre el río Hudson debido a la perdida de los dos motores por un impacto con aves.

- El mayor riesgo de impactos con aves ocurre por debajo de los 3500 ft.

• 60% of bird strike occurs below 500 ft (approx. 150 m),
• 90% below 1 500 ft (approx. 500 m), and
• almost 100% below 3 500 ft (approx. 1 200 m).

- El procedimiento publicado por ICAO para recoger datos y diseminarlos sobre impactos con aves es llamado IBIS (Bird Strike Information System)

- Los principales focos de atraccion de pájaros en las cercanías de los aeropuertos son los vertederos y las zonas de hierbas altas.

7.-Reducción de ruido

Vamos a ver los procedimientos de reducción (NAD, Noise Abatement Departure) de ruido **que se llevan a cabo en la operación de despegue y todas sus características. Encontraréis dos videos donde sale explicado el procedimiento y al final del post un banco de preguntas.**

- Hay dos tipos de procedimientos diferentes (NADP1 y NADP2) para la reducción de ruido. El primero es un poco más restricitivo que el segundo para evitar el ruido cerca de las poblaciones cercanas al aeropuerto. A continuación os dejo unas imagenes con la explicación de cada uno.

NADP 1

2. Noise abatement climb — Example of a procedure alleviating noise close to the aerodrome (NADP 1)

2.1 This procedure involves a power reduction at or above the prescribed minimum altitude and the delay of flap/slat retraction until the prescribed maximum altitude is attained. At the prescribed maximum altitude, accelerate and retract flaps/slats on schedule while maintaining a positive rate of climb, and complete the transition to normal enroute climb.

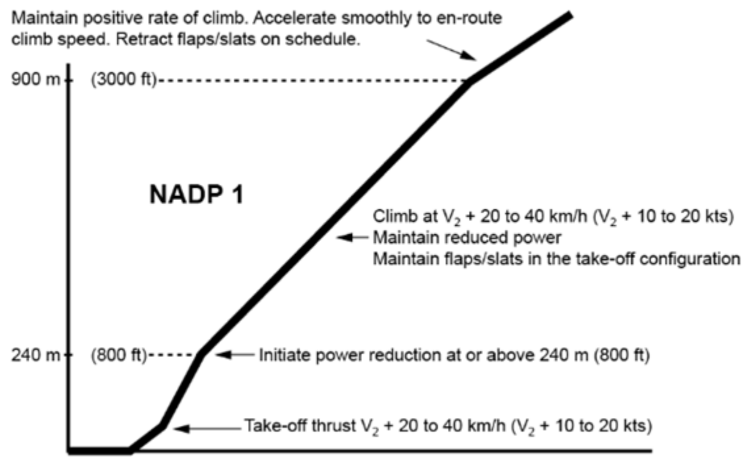
2.2 The noise abatement procedure is not to be initiated at less than 240 m (800 ft) above aerodrome elevation.

2.3 The initial climbing speed to the noise abatement initiation point shall not be less than V_2 + 20 km/h (10 kt).

2.4 On reaching an altitude at or above 240 m (800 ft) above aerodrome elevation, adjust and maintain engine power/thrust in accordance with the noise abatement power/thrust schedule provided in the aircraft operating manual. Maintain a climb speed of V_2 + 20 to 40 km/h (10 to 20 kt) with flaps and slats in the take-off configuration.

2.5 At no more than an altitude equivalent to 900 m (3 000 ft) above aerodrome elevation, while maintaining a positive rate of climb, accelerate and retract flaps/slats on schedule.

2.6 At 900 m (3 000 ft) above aerodrome elevation, accelerate to en-route climb speed.



NADP2

3. Noise abatement climb — Example of a procedure alleviating noise distant from the aerodrome (NADP 2)

3.1 This procedure involves initiation of flap/slat retraction on reaching the minimum prescribed altitude. The flaps/slats are to be retracted on schedule while maintaining a positive rate of climb. The power reduction is to be performed with the initiation of the first flap/slat retraction or when the zero flap/slat configuration is attained. At the prescribed altitude, complete the transition to normal en-route climb.

3.2 The noise abatement procedure is not to be initiated at less than 240 m (800 ft) above aerodrome elevation.

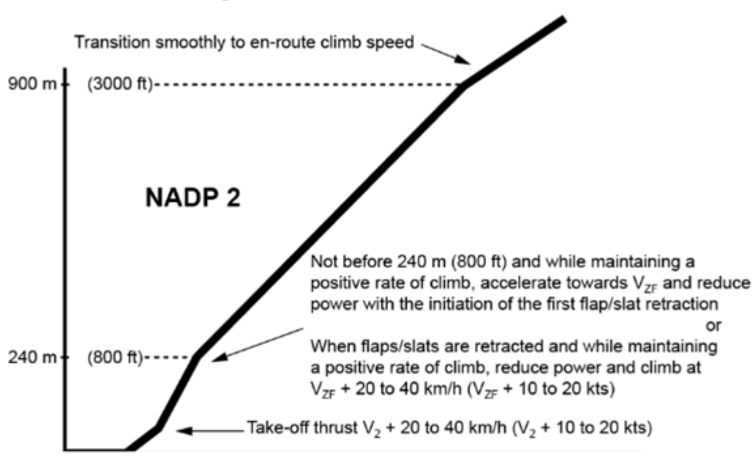
3.3 The initial climbing speed to the noise abatement initiation point is V_2 + 20 to 40 km/h (10 to 20 kt).

3.4 On reaching an altitude equivalent to at least 240 m (800 ft) above aerodrome elevation, decrease aircraft body angle/angle of pitch while maintaining a positive rate of climb, accelerate towards V_{ZF} and either:

a) reduce power with the initiation of the first flap/slat retraction; or
b) reduce power after flap/slat retraction.

3.5 Maintain a positive rate of climb, and accelerate to and maintain a climb speed of V_{ZF} + 20 to 40 km/h (10 to 20 kt) to 900 m (3 000 ft) above aerodrome elevation.

3.6 On reaching 900 m (3 000 ft) above aerodrome elevation, transition to normal en-route climb speed.



- La información sobre la reducción de ruidos se encuentra en el AIP Part AD.

- Ante las siguientes condiciones podemos ignorar los procedimientos de reducción de ruidos:

1. Viento cruzado de más de 15 kt
2. Viento en cola de más de 5 kt

8.- Despresurización de cabina

En este tema se ven los siguientes procedimientos operacionales a seguir en caso de una despresurización de cabina.

- La altitud de presión de cabino no debe excerder los 8000ft. Si los excede, a partir de 10.000 ft tenemos un aviso sonoro de emergencia y a partir de los 15.000 caen automaticamente las mascarillas de oxígeno.

> 8 000 ft - normal cabin alt
> 10 000 ft - a warning sounds
> 15 000 ft - oxygen masks drop
>
> CS 25.841 Pressurised cabins
> (a) Pressurised cabins and compartments to be occupied must be equipped to provide a cabin pressure altitude of not more than 2 438 m (8 000 ft) at the maximum operating altitude of the aeroplane under normal operating conditions. If certification for operation over 7 620 m (25 000 ft) is requested, the aeroplane must be able to maintain a cabin pressure altitude of not more than 4 572 m (15 000 ft) in the event of any reasonably probable failure or malfunction in the pressurisation system.
>
> (b) Pressurised cabins must have at least the following valves, controls, and indicators for controlling cabin pressure:
> [...]
> (6) Warning indication at the pilot or flight engineer station to indicate when the safe or pre-set pressure differential and cabin pressure altitude limits are exceeded. Appropriate warning markings on the cabin pressure differential indicator meet the warning requirement for pressure differential limits and an aural or visual signal (in addition to cabin altitude indicating means) meets the warning requirement for cabin pressure altitude limits if it warns the flight crew when the cabin pressure altitude exceeds 3 048 m (10 000 ft).

- A continuación os dejo una explicación muy buena para que entendáis como funciona la presurización en un avión y los fenómenos asociados a una rápida despresurización.

> Generally, the cabin altitude of modern transport pressurized aircraft is around 8 000 ft (regulations typically do not allow higher cabin altitudes). When a slow decompression occurs, for example due to a relatively small leak or due to the malfunction of the on-board pressurization systems, the cabin altitude will tend to equal the aircraft altitude - the cabin altitude starts to increase, or in other words the cabin starts climbing (= pressure inside the cabin starts to decrease). This means that the differential pressure (between the cabin and exterior) starts to reduce, until reaching zero at the moment that the external pressure equals cabin pressure. Since the cabin altitude rate of climb/descent indicator shows the change in the cabin's altitude, just like the Vertical Speed Indicator, it will indicate a climb.
>
> The phenomena associated with a rapid depressurization are:
> • loud bang or other such noise in the case of rapid depressurization;
> • change in environmental sounds in case of any type of depressurization;
> • change in cabin temperature (it gets cold, very cold);
> • mist in the cabin in case of a rapid decompression.
> • loose items and dust are going to move towards the leak
> • loose items close to the area being sucked out of the aircraft
>
> *Two examples of rapid decompressions are British Airways flight 5390, where a pilot was partly sucked out of the cockpit window but luckily survived, and Southwest Airlines flight 1380, where a passenger was sucked out partly but sadly died in the hospital.*

- La siguiente tabla indica el tiempo que tenemos para estar conscientes en caso de una despresuriación explosiva. De ahí la importancia de colocarse la máscara de oxígeno nada más detectemos que hemos sufrido una descomprensión explosiva, el tiempo de reacción es muy pequeño.

Altitude	Slow Decompression		Rapid Decompression
	Seated	Active	
25000	5 min	3 min	2 min
30000	1.5 min	45 sec	30 sec
35000	45 sec	30 sec	20 sec
40000	25 sec	18 sec	12 sec

- Las máscaras de colocación rápida para los pilotos deben de obligada instalación en los aviones que vuelen a altitudes superiores a los 25.000ft.

9.-Cizalladura (wind shear)

La cizalladura o wind shear, es un cambio brusco en la dirección y velocidad del viento, afectando a la velocidad y sustentación de la aeronave, teniendo consecuencias desastrosas sino se actua adecuadamente. Vamos a ver los procedimientos a realizar en caso de wind shear y como se comporta este fenómeno meteorológico

- A continuaciñon os dejamos la explicación de lo que es la cizalladura y los diferentes fenómenos que la pueden llegar a producir.

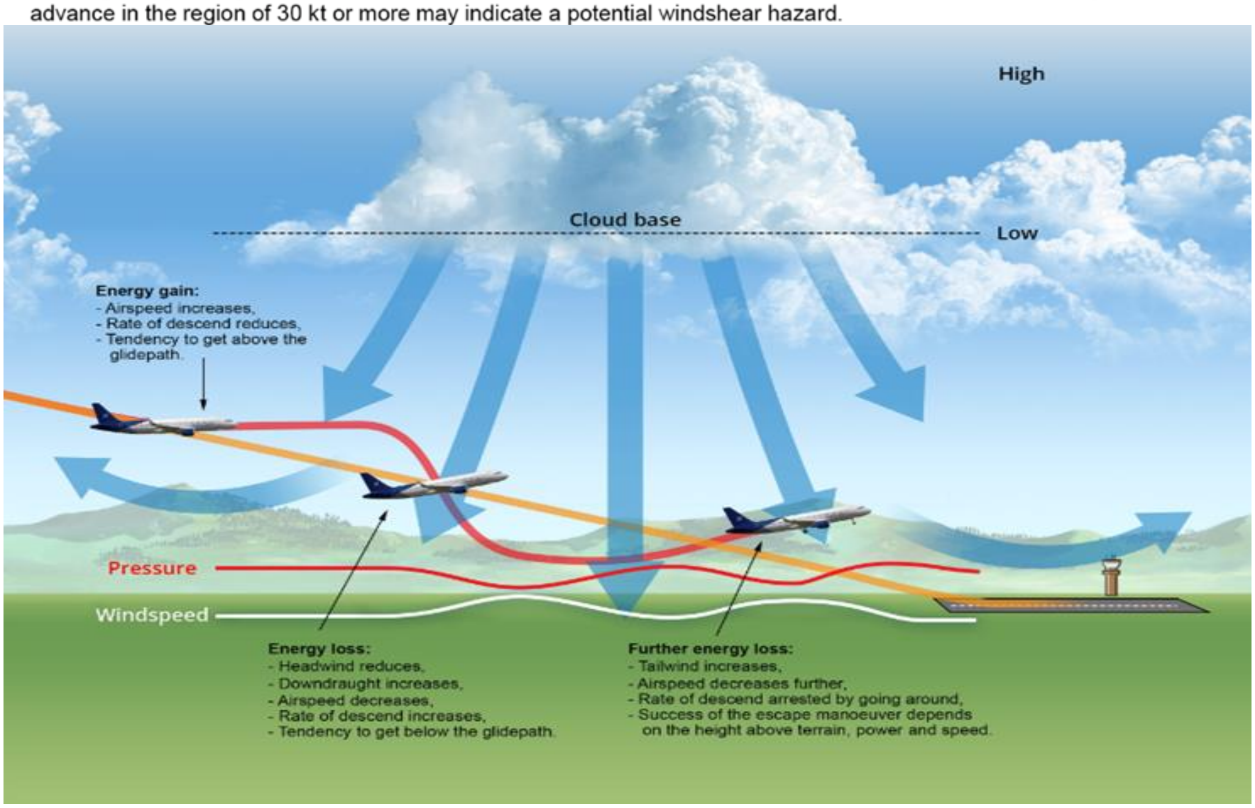
WINDSHEAR

In its simplest form a general definition of windshear can be described as "a significant change in wind direction and / or speed including both downdraughts and updraughts". A more complex way to define windshear, taking into account its effects on aircraft in flight, would be: "Variations in the wind vector along the flight path of an aircraft with a pattern, intensity and duration that will displace an aircraft abruptly from its intended flight path such that substantial control input and action is required to correct it". We can also define specific types, or let's say qualifying descriptors of windshear:

- **Low Level (altitude) windshear**: "Windshear along the final approach path or along the runway and along the take-off and initial climb-out flight paths". It is generally accepted standard that when talking about Low Level windshear we refer to heights below 1600 ft above the ground level.
- **Vertical windshear**: "The change of horizontal wind vector with height, as might be determined by two or more anemometers at different heights on a mast". In other words, a change in the horizontal wind direction and / or speed experienced as a result of a change in altitude (vertical variation of position).
- **Horizontal windshear**: "The change of the horizontal wind vector with horizontal distance, as might be determined by two or more anemometers mounted at the same height along a runway". In other words, a change in the horizontal wind direction and / or speed experienced as a result of a change in location in the horizontal plane (horizontal variation of position).
- **Updraught or downdraught shear**: "The changes in the vertical component of wind vector with horizontal distance".

Windshear occurrence and greatest danger to aircraft is most frequently associated with thunderstorms, but other meteorological phenomena can also be the cause of windshear occurrence - these are for example a frontal passage, significant temperature inversion, low level jets, katabatic (down-slope) winds or jetstreams. Windshear can also be caused by the topographical relief of the ground (e.g. mountains) or by buildings.

- **Thunderstorms (TS)**: We know that strong up- and down-draughts are associated with TS, therefore an updraught or downdraught windshear can be experienced anywhere in the thunderstorm CB cloud. Sometimes a very strong downdraught of cold air "breaks out" from the CB cloud (typically from the leading edge of the cloud) creating a so called "**gust front**" ahead of the cloud. This air sweeps along the ground and a rapid wind change (and thus also turbulence) usually takes place at the leading edge of the gust front. Another very dangerous phenomenon associated with TS that almost guarantees a very dangerous windshear possibility is the "**microburst**". It is a highly concentrated and powerful downdraught of air from the CB cloud.
- **Inversions**: low level temperature inversions can sometimes "block" a relatively strong winds above the inversion to penetrate the inversion layer and relatively light or calm winds prevail near the surface. Windshear can therefore be encountered when passing through the inversion layer. Both a wind speed change as well as wind direction change can be experienced.
- **Frontal passage**: Fronts vary in strength and normally only well-developed active fronts, with narrow surface frontal zones and with marked temperature differences between the two air masses are likely to carry a windshear risk. Weather charts showing sharp changes in wind direction across the front, temperature differences of 5°C or more, or a speed of frontal advance in the region of 30 kt or more may indicate a potential windshear hazard.



- Los **pasos a seguir** por el piloto al mando de la aeronave en caso de cizalladura son los siguientes: 1º **Activar la máxima potencia** (TOGA) 2º **subir gradualmente el morro hasta que notemos el stick-shaker** pero sin activarlo, asegurarse de que el **speed-brake** está retraido y **mantener la configuración del avión** (no subir ni flaps, ni tren).

- Explicación de lo que es un microburst

"MICROBURST" is an area where very potent downdraught wind shear can be experienced. It is a very localized column of rapidly sinking air, producing damaging divergent and straight-line winds at the surface (you can imagine a microburst to be opposite to tornado). Microbursts produce severe downdraughts, descending from a cumulonimbus cloud. When this vertical airflow reaches the ground, it splays horizontally from the centre of the microburst. At the centre of the microburst, the cushion effect increases slightly the local pressure. The scale and suddenness of a microburst makes it a great danger to aircraft due to the low-level wind shear caused by its gust front. The range of microburst can be as much as 32 km horizontal distance close to the surface away from the storm (or further in the case of several storms forming a squall line) with the vertical extent of up to 6 000 ft. Microbursts are capable of generating wind speeds higher than 140 kts.

10.- Estela turbulenta (wake turbulence)

La estela turbulenta es un torbellino o una masa de aire que gira sobre si misma generados por los extremos de las alas siempre y cuando el avión este generando sustentación o sea volando. Siguiente post vamos a ver más características sobre la estala turbulenta y al final del post tenéis un banco de preguntas resuelto para repasar.

- A continuación veréis la tabla que indica las separación que hay que dejar debido a la estela turbulenta dependiendo del tipo de aeronave. De toda maneras hay una regla nemotécnica que consiste en aplicar para Light aircrafts -8, para Medium aircrafts +3 y para Heavy aircrafts +2, asi que por ejemplo la seperación entre una Medium (+3) y una Heavy (+2) será (+3)+(+2)= 5 NM. Otro ejemplo, entre una Light (-8) y una Heavy (+2) será (-8)+(+2)= 6 NM.

Preceding aircraft	Succeeding aircraft	Wake turbulence radar separation minima
HEAVY	HEAVY	7.4 km (4.0 NM)
	MEDIUM	9.3 km (5.0 NM)
	LIGHT	11.1 km (6.0 NM)
MEDIUM	LIGHT	9.3 km (5.0 NM)

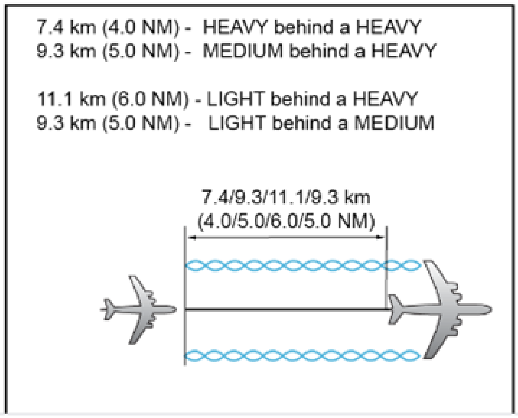
8.7.3.4.1 The minima set out in 8.7.3.4 shall be applied when:

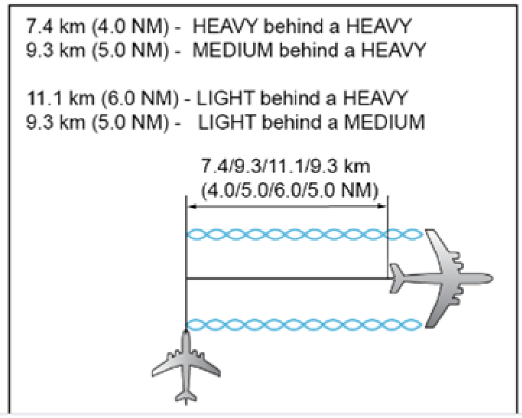
a) an aircraft is operating directly behind another aircraft at the same altitude or less than 300 m (1 000 ft) below; or

b) both aircraft are using the same runway, or parallel runways separated by less than 760 m (2 500 ft); or

c) an aircraft is crossing behind another aircraft, at the same altitude or less than 300 m (1 000 ft) below.

Note.— See Figures 8-1A and 8-1B.





- Otra regla nemotécnica para recortar los tiempos de separación dependiendo el tipo de aeronave (L, M o H) es recordar **DODDIA** (**D**eparture 2 min, **O**pposite 2 min, **D**isplaced 2 min, **I**ntermediate 3 min and **A**rrival 2 min (3 min for light).

- La estela turbulenta de una aeronave pesada desaparece completamente después de 3 min.

- La estela turbulenta más grande es cuanto mayor sea la aeronave, más pesada, menor velocidad lleve y con configuración limpia.

- Se considera aeronave ligera hasta 7000 kg, nave media de 7001 kg a 136000 kg y heavy cuando es mayor de 136.000 Kg.

- Los vórtices se desplazan desde la parte inferior del ala a la parte superior.

11.- Interferencia ilícita

Interferencia ilícita es el tema de Procedimientos Operacionales que habla sobre **los secuestros de aeronaves**. Es un tema muy cortito pero que hay que tener claro un par de cosas. Al final del post, como siempre, tenéis un banco de preguntas para repasar

- El estado en cual la aeronave ha aterrizado debe notificar inmediatamente del secuestro al estado de registro de la aeronave, el estado del operador e ICAO.

- En caso de secuestro el código del transpondedor debe cambiarse a **7500**.

- A continuación podéis leer los procedimientos que **hay que llevar a cabo en caso de secuestro sin poder mantener contacto con ATC**:

> **1. General**
> The following procedures are intended as guidance for use by aircraft when unlawful interference occurs and the aircraft is unable to notify an ATS unit of this fact.
>
> **2. Procedures**
> 2.1 If the pilot-in-command cannot proceed to an aerodrome in accordance with the rules in Chapter 3, 3.7.2, he/she should attempt to continue flying on the assigned track and at the assigned cruising level at least until able to notify an ATS unit or until within radar or ADS-B coverage.
>
> 2.2 When an aircraft subjected to an act of unlawful interference must depart from its assigned track or its assigned cruising level without being able to make radiotelephony contact with ATS, the pilot-in-command should, whenever possible:
>
> a) attempt to broadcast warnings on the VHF channel in use or the VHF emergency frequency, and other appropriate channels, unless considerations aboard the aircraft dictate otherwise. Other equipment such as on-board transponders and data links should also be used when it is advantageous to do so and circumstances permit; and
>
> b) proceed in accordance with applicable special procedures for in-flight contingencies, where such procedures have been established and promulgated in the Regional Supplementary Procedures (**Doc 7030**); or
>
> c) if no applicable regional procedures have been established, proceed at a level which differs from the cruising levels normally used for IFR flight by:
> 1) 150 m (500 ft) in an area where a vertical separation minimum of 300 m (1 000 ft) is applied; or
> 2) 300 m (1 000 ft) in an area where a vertical separation minimum of 600 m (2 000 ft) is applied.

12.- Aterrizajes de emergencia (procedimientos)

- En los aviones de más de 44 pasajeros, se tiene que evacuar la totalidad del pasaje en menos de **90 segundos** a través del 50% de la salidas de emergencia.

- Aterrizajes de emergencia sobre un bosque, matorrales… se tiene que hacer a la mínima velocidad posible con los flaps extendidos y ya dependerá de si es un bosque alto aterrizar con el tren de aterrizaje desplegado y si es un bosque bajo o matorrales aterrizar sin el tren de aterrizaje.

> An emergency landing on a dense forest should be done with the slowest speed possible, therefore flaps should be down in any case. The slower the speed, the less hard is the impact.
>
> The gear should be extended if the trees are high because some of the kinetic energy can be absorbed by the gear. A problem might occur if the gear tears off and ruptures the fuel tank. In case of low trees or fields (with low or no plants) or any soft ground, it is recommended to maintain the gear in its retracted position.

- En caso de amerizaje, **SIEMPRE** aterrizar paralelos a las olas y **NUNCA** perpendicularmente para evitar que voltee el avión.

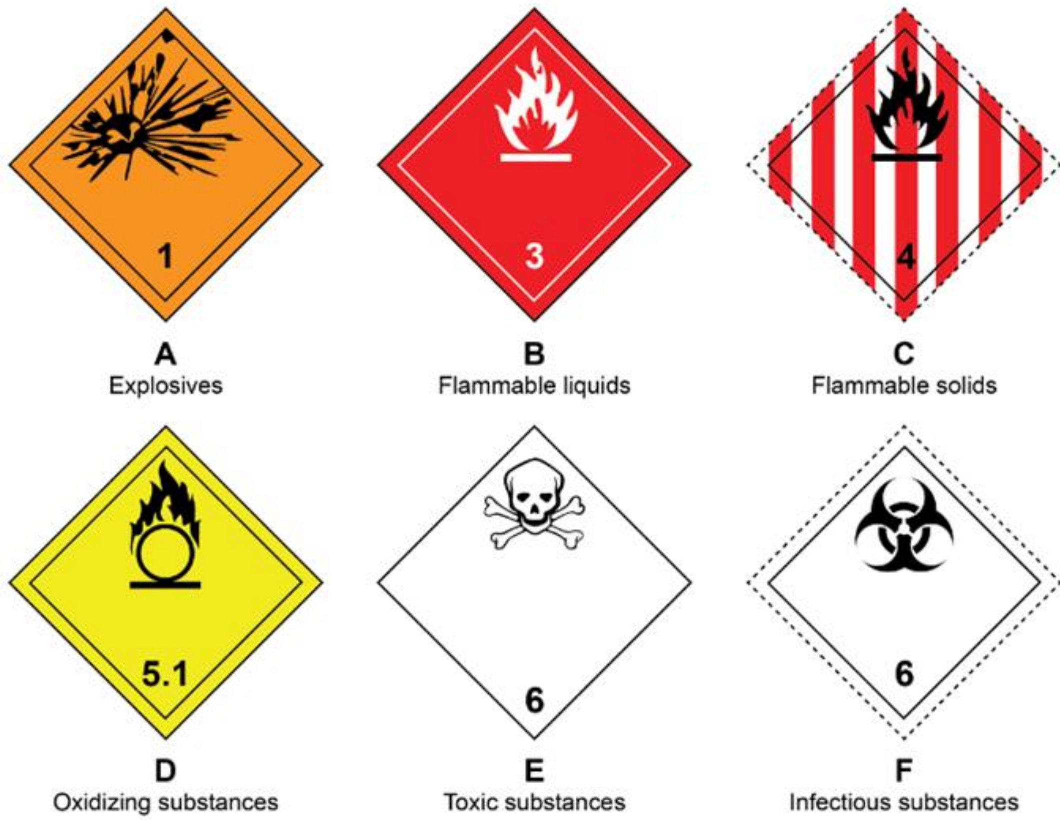
13.-Fuel Jettison

El fuel Jettison es la maniobra en la cual el avión descarga de forma rápida el combustible para reducir su peso y no superar su peso máximo peso (MLW, maximum landing weight) en el aterrizaje y dañar las partes de la aeronave en caso de un aterrizaje de emergencia.

- El tiempo máximo requerido para el fuel Jettison es de **15 minutos.**
- La altura mínima a la que se tiene que realizar la suelta de fuel es de 1800 m. / 6000 ft AGL

14.-Transporte de mercancías peligrosas en aeronaves

- La información en la cual encontramos toda la información sobre que materiales peligrosos pueden ser transportados se encuentra en el documento de **ICAO «Technical Instructions for the safe Transport of dangerous Goods by Air»**.
- La lista sobre lo que los pasajeros pueden transportar está en el **Anexo18**.
- El documento del tranporte de mercancia peligrosas puede ser preparado por el **transportista (shipper)**.
- A continuación os dejamos las señales de mercancias peligrosas:



- La autorización para el transporte de mercancías peligrosas está especificado en el **certificado del operador aéreo**.
- Todos los documentos sobre mercancías peligrosas tienen que estar en **inglés**.
- Os dejamos a continuación las responsabilidades del transportista y alguna información importante sobre el transporte de mercancias peligrosas.

ICAO Annex 18, Chapter 7 - Shipper's responsibilities:
7.1 General requirements
Before a person offers any package or overpack of dangerous goods for transport by air, that person shall ensure that the dangerous goods are not forbidden for transport by air and are properly classified, packed, marked, labelled and accompanied by a properly executed dangerous goods transport document, as specified in this Annex and the Technical Instructions.

7.2.1 Unless otherwise provided for in the Technical Instructions, the person who offers dangerous goods for transport by air shall complete, sign and provide to the operator a dangerous goods transport document, which shall contain the information required by those Instructions.

7.2.2 The transport document shall bear a declaration signed by the person who offers dangerous goods for transport indicating that the dangerous goods are fully and accurately described by their proper shipping names and that they are classified, packed, marked, labelled, and in proper condition for transport by air in accordance with the relevant regulations.

7.3 Languages to be used
In addition to the languages which may be required by the State of Origin and pending the development and adoption of a more suitable form of expression for universal use, English should be used for the dangerous goods transport document.

EASA AIR OPS
CAT.GEN.MPA.200 Transport of dangerous goods
(a) Unless otherwise permitted by this Annex, the transport of dangerous goods by air shall be conducted in accordance with Annex 18 to the Chicago Convention as last amended and amplified by the 'Technical instructions for the safe transport of dangerous goods by air' (ICAO Doc 9284-AN/905), including its supplements and any other addenda or corrigenda.

(b) Dangerous goods shall only be transported by an operator approved in accordance with Annex V (Part-SPA), Subpart G, except when:
(1) they are not subject to the technical instructions in accordance with Part 1 of those instructions; or
(2) they are carried by passengers or crew members, or are in baggage, in accordance with Part 8 of the technical instructions.

(c) An operator shall establish procedures to ensure that all reasonable measures are taken to prevent dangerous goods from being carried on board inadvertently.

(d) The operator shall provide personnel with the necessary information enabling them to carry out their responsibilities, as required by the technical instructions.

(e) The operator shall, in accordance with the technical instructions, report without delay to the competent authority and the appropriate authority of the State of occurrence in the event of:
(1) any dangerous goods accidents or incidents;
(2) the discovery of undeclared or misdeclared dangerous goods in cargo or mail; or
(3) the finding of dangerous goods carried by passengers or crew members, or in their baggage, when not in accordance with Part 8 of the technical instructions.

(f) The operator shall ensure that passengers are provided with information about dangerous goods in accordance with the technical instructions.

(g) The operator shall ensure that notices giving information about the transport of dangerous goods are provided at acceptance points for cargo as required by the technical instructions.

15.- Pista contaminada (Procedimientos operacionales)

Vamos a ver la acciones que se tienen que llevar a cabo cuando la pista está contaminada, ya sea por agua, nieve, hielo… En una tercera parte de la salidas de pista de aeronaves, la pista estaba contaminada por lo que es un tema a tener muy encuenta y saber que hacer cuadno nos encontramos ante unas condiciones como éstas.

- El hidroplaning depende principalmente de la profundidad de la capa de agua que hay sobre la pista.
- La eficacia de frenado es una información que se da a los pilotos depende las condiciones de la pista en: pobre, media o buena. Ésto junto con las condiciones de viento, peso de la aeronave… da una serie de datos para analiazar por los pilotos y tomar las acciones requeridas.

For take-off, as for landing, the aerodrome authorities measure the runway surface coefficient of friction and estimate the braking action. The reported braking action passed to the pilot is that of a vehicle unaffected by any condition other than that of the surface. It is therefore the pilot who must use his judgment of the other factors affecting the aircraft, such as crosswind and aeroplane mass, to place the appropriate interpretation on the reported conditions. A broad guide of braking action assessments (which should nevertheless be used with discretion) is as follows:

(a) **GOOD**: Pilots can expect to take-off and/or land within the scheduled wet distances without undue directional control or braking difficulties caused by the runway conditions. Untreated ice does not come into this category but gritted ice could produce the friction required.

(b) **MEDIUM**: Aircraft are likely to use all of the wet scheduled distance, including the safety factor part of the distance. Directional control may be impaired. The achievement of satisfactory landing performance depends on the precise execution of the recommended flight technique.

(c) **POOR**: The pilot must expect the aircraft to run at least the full "very wet" or aquaplaning distance, where this too is scheduled. There may be a significant deterioration in braking performance and in directional control. It is advisable to ensure that the landing distance specified in the flight Operations Manual for very wet conditions does not exceed the landing distance available.

- Os dejamos la definición de los siguientes terminos dependiendo lo contaminada que este la pista:

Annex I / Definitions for terms used in Annexes II-VII
'Contaminated runway' means a runway of which more than 25 % of the runway surface area within the required length and width being used is covered by the following:
(a) surface water more than 3 mm (0.125 in) deep, or by slush, or loose snow, equivalent to more than 3 mm (0.125 in) of water;
(b) snow which has been compressed into a solid mass which resists further compression and will hold together or break into lumps if picked up (compacted snow); or
(c) ice, including wet ice;

'Damp runway' means a runway where the surface is not dry, but when the moisture on it does not give it a shiny appearance;

'Dry runway' means a runway which is neither wet nor contaminated, and includes those paved runways which have been specially prepared with grooves or porous pavement and maintained to retain 'effectively dry' braking action even when moisture is present;

'Wet runway' means a runway of which the surface is covered with water, or equivalent, less than specified by the 'contaminated runway' definition or when there is sufficient moisture on the runway surface to cause it to appear reflective, but without significant areas of standing water.

- Los tres factores que afectan al aguaplaning son las capa de agua sobre la pista, el dibujo de los neumáticos y la presión de los neumáticos. Esta última se puede calcular con una sencilla fórmula matemática que os dejamos explicado a continuación .

  Velocidad de hydroplaning = 9 x raiz cuadrada de presión PSI.

  Velocidad de hydroplaning = 34 x raiz cuadrada de presión en Bar.

Hydroplaning, which adversely affects an aircraft's capability to brake, depends on the water layer, the depth of the tyre's pattern and the pressure. Tests have shown that for a rotating wheel (the case of aborted take-off), hydroplaning occurs at a speed of 9 × square root (tyre pressure in psi). For a stopped wheel (initial spin-up on touchdown), the same effect starts at a lower speed, as low as 7.7 × square root (tyre pressure in psi). For a 200 psi tyre, the lower hydroplaning speed is 109 kt and the higher one is 127 kt. In this case, any flap setting results in an approach speed higher than the hydroplaning speed and hence it is likely that the effect will occur irrespective of flaps.

- Un SNOWTAM es un informe especial del NOTAM que informa a los pilotos de las condiciones del aeropuerto en invierno. En la siguiente tabla sale explicado los diferentes apartados de un SNOWTAM.

More information---
A SNOWTAM is a special form of NOTAM intended to inform pilots about the winter operations conditions on an aerodrome. It contains data on runway and taxiway contamination situation and associated hazards. A SNOWTAM is valid for a maximum period of 24 hours but will be revised with every significant change in conditions. Runway surface friction for every third of the runway is reported under H) using the following codes:
5: good
4: good to medium
3: medium
2: medium to poor
1: poor

SNOWTAM data (general)
A SNOWTAM consists of a header and body. The format of the body is as follows:
A) = Aerodrome identifier
B) = Date and time of observation
C) = Runway designator number
D) = Cleared length of runway in metres, if less than published length; further details in T)
E) = Cleared width of runway in metres, if less than published width; additional L or R if offset from centreline
F) = Type of deposit on every third of the runway
G) = Average depth in millimetres on every third of the runway
H) = Estimated surface friction on every third of the runway
N) = Taxiway conditions, codes as in F)
R) = apron conditions, codes as in F)
T) = plain language additions of other significant information

- Si no tenemos información sobre la pista y está está mojada, debemos añadir un 15% más del total de nuestra distancia de aterrizaje.

- Un SNOWTAM tiene una validez de 24 horas.

- Una aproximación con lluvias fuertes tenemos que aumentar ligeramente la velocidad de aproximación porque la sustentación se ve disminuidad.

- Un aterrizaje con riesgo de hydroplaning hay que aplicar máxima reversa e intertar aplicar los frenos lo antes posible.

- Depende del coeficiente de contaminación que nos da en el apartado H del SNOWTAM, con la siguiente tabla podemos saber las condiciones de la pista y la cantidad de frenada que debemos aplicar.

Measured or	Estimated Surface
Calculated Coeff	Friction
0.40 and above	Good (brakes 5)
0.39 - 0.36	Medium / Good (brakes 4)
0.35 - 0.30	Medium (brakes 3)
0.29 - 0.26	Medium / Poor (brakes 2)
0.25 and below	Poor (brakes 1)
9 - unreliable	Unreliable (brakes 9)

ICAO Annex 15 - Appendix 2 - SNOWTAM - Item H:
Friction measurements on each third of the runway and friction measuring device.

- En el apartado F del SNOWTAM nos dice el tipo de depósito sobre la pista, sale indicado con un número, ese número lo podéis buscar en la siguiente tabla que os dejo a continuación para saber el tipo de depósito sobre la pista.

The type of deposit is reported under F) using the following codes:
NIL: Clear and dry
1: Damp
2: Wet
3: Rime or frost (less than 1mm)
4: Dry snow
5: Wet snow
6: Slush
7: Ice
8: Compacted or rolled snow
9: Frozen ruts or ridges
Slush is reported for the first and second segment of runway 08.

- Os dejo un ejemplo de como es un SNOWTAM.

SNOWTAM 0183
A) ESSA
B) 01230720
C) 01L
F) 5/5/5
G) 02/02/02
H) 4/3/3
N) 25/MEDIUM 02MM CONTAMINATION 50 PERCENT

C) 01R
F) 5/5/5
G) 01/02/02
H) 5/5/4
N) 25/MEDIUM 02MM CONTAMINATION 50 PERCENT

C) 08
F) 6/6/5
G) 01/01/01
H) 4/4/4
N) 25/MEDIUM 01MM CONTAMINATION 25 PERCENT

R) 25/POOR 08MM CONTAMINATION 100 PERCENT
T) DE ICING FLUIDS ON RWY 01L 01R AND 08

- Aquí sale indicado lo que significa cada letra del SNOWTAM.

Complete SNOWTAM data
(for info only! So far, EASA only requires you to find contamination (F)and braking action (H) data)
A SNOWTAM consists of a header and body. The format of the body is as follows:
A) = Aerodrome identifier; here: ESSA
B) = Date and time of observation; here: January 23rd, 0720 UTC
C) = Runway designator number; here 01L in first block
D) = Cleared length of runway in metres, if less than published length; further details in T)
E) = Cleared width of runway in metres, if less than published width; additional L or R if offset from centerline
F) = Type of deposit on every third of the runway, here: wet snow over entire length of runway
G) = Average depth in millimetres on every third of the runway; here: 2 mm over the entire length
H) = Estimated surface friction on every third of the runway; here: medium to good in first third of runway, medium thereafter. (Generally speaking: the higher the number, the better the friction)
N) = Taxiway conditions, codes as in F)
R) = apron conditions, codes as in F)
T) = plain language additions of other significant information