

Introductory Notes on Aviation Meteorological Instruments

for

(E-Learning – Phase-I of Advanced Training in Instrumentation and Information Systems)

I. Role of Meteorological Instruments for Aviation

Weather factors have marked influence on the operation and performance of modern aircrafts. The impact of a relatively small change in parameters like Wind, Temperature, Visibility, Pressure, Cloud base height etc., on air operations is very high.

Wind: Wind observations are used for the selection of runways and for the determination of the maximum allowable take-off and landing weights. Landing is not generally allowed when a crosswind component exceeds 45 kmph

Temperature: Temperature is important in view of engine performance and required take-off speed. High temperature means lower air density which reduces lift, resulting in the need for higher take-off speeds and consequently more runway length. If runway length is insufficient, take-off weights have to be reduced.

Pressure: The atmospheric pressure measured at the aerodrome is used for the altimeter setting of the aircraft. It is evident that pilots must be able to rely absolutely on the pressure values provided by the meteorological stations of the aerodrome during landing.

Visibility: Low visibility is a crucial factor affecting traffic at aerodromes. The minimum visibility at which take-off is allowed depends on the facilities like instruments landing systems at the aerodrome.

Cloud base height: An accurate estimate of the height of base of low clouds is very essential for safe landing of the aircraft. This information gives advance warning to the pilot about the height at which he will be able to see the runway markings, edge lights etc. when low clouds persist over the landing area of the aerodrome

So the availability of reliable and representative observations at aerodromes to support take-off and landing operations are of critical importance.

II. Accuracy requirements:

Accuracy: The closeness of the agreement between the result of a measurement and a true value of the measurand. 2.0 Accuracy is a qualitative concept

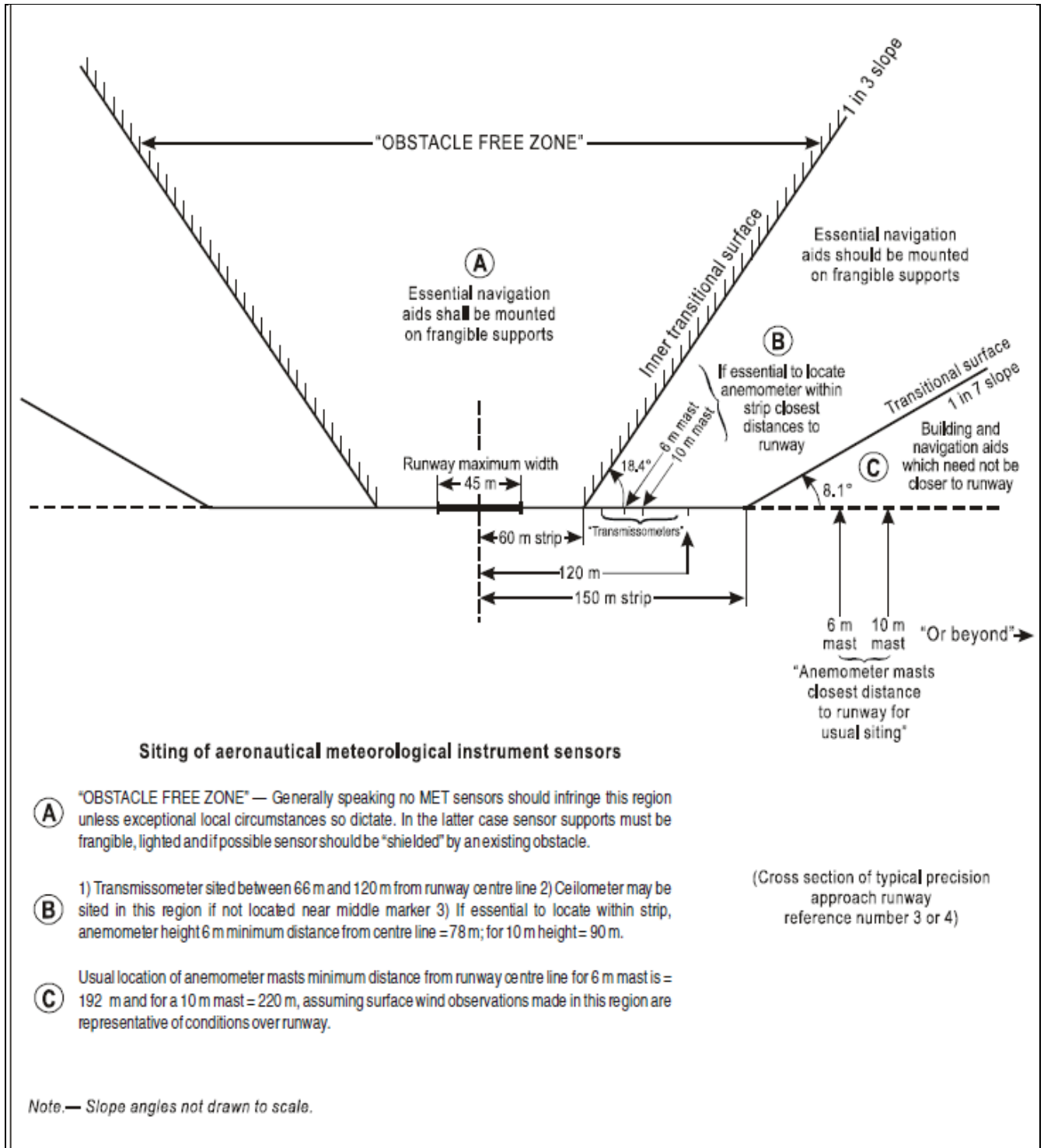
Resolution: A quantitative expression of the ability of an indicating device to distinguish meaningfully between closely adjacent values of the quantity indicated.

ICAO documents dealing with aviation

ICAO Annexure-III : site selection for installation of AMIS, Height of meteorological sensors above runway level, accuracy & resolution & averaging for reporting met parameters, METAR and speci reporting criteria, forecasting accuracies for TAF and other reports etc.

ICAO Document-9328 : Instruments for reporting Visibility, Runway Visual Range, Site selection criteria for RVR instruments, Reporting MOR & RVR, All algorithm related for computation of MOR & RVR for all Categories og Instrument Landing System.

III. Runway complex and touchdown area:



IV. Criteria for installation of Met instruments at airport:

1. Site should have free exposure conditions away from nearest boundary wall.
2. Site shall be Free from bushes, leveled and shall be same level as that of Runway.
3. Site Dimensions of atleast 50m x 5m
4. Site shall be within 120m from Central line of runway
5. Site shall be within 300m from runway threshold (ie beginning of runway).
6. Height of sensors : Wind → 6m to 10m, Temperature : 2m and Visibility, MOR & RVR :2.5m

V. Definition of Category of airports and No of Instruments required for each category:

Category is instrument landing System installed at airport and for minimum RVR required for landing and also decision height/

- Cat-I : ILS RVR minima is 550m and decision height is 60m
CAT-II : RVR minima is 350m and decision height is 30mts to 60mts
CAT-III : RVR minima is 200mts and decision height is 15 to 30mts
CAT-II-B : RVR minima is 50mts and Decision height is 15mts
CAT-IIIC : RVR minima & Decision height is zero

No of instruments required for each category

Catogory	Runway length	RVR	Ceilometer
I	< 2400 m	1	1
I	> 2400 m	2	1
II	< 2400 m	2	1
II	> 2400m	3	2
III	< 2400 m	3	2
III	> 2400 m	5	2
