Manual on Codes

International Codes

VOLUME I.1

PART A – Alphanumeric Codes

2011 edition

Updated in 2014

World Meteorological Organization

WMO-No. 306

Weather • Climate • Water

Manual on Codes

International Codes

Volume I.1

(Annex II to WMO Technical Regulations)

Part A – Alphanumeric Codes

WMO-No. 306

World Meteorological Organization

Weather • Climate • Water

2011 edition

Updated in 2014

PUBLICATION REVISION TRACK RECORD

Date	*Part/ chapter/ section*	*Purpose of amendment*	*Proposed by*	*Approval Resolution or other*
2012	Part A, Section C, b. Code tables	Consolidation of amendments approved ~~by the procedure for adoption of amendments~~ in May 2012	CBS/OPAG-ISS/IPET-DRC	Procedure for adoption of amendments between CBS sessions (OBS/WIS/DRMM/DRC (PR-6630))
2013	Part A, Sections A, B and C	Consolidation of amendments approved ~~by the procedure for adoption of amendments~~ in May 2013	CBS/OPAG-ISS/ IPET-DRMM	Procedure for adoption of amendments between CBS sessions (OBS/WIS/DRMM/DRC (PR-6688))
2013	Introduction	Clarification of the procedures for amending the Manual	CBS/OPAG-ISS/ IPET-DRMM	Resolution 15 (EC-65)
2014	Part A, Section A	Consolidation of amendments approved in April 2014	CBS/OPAG-ISS/ IPET-DRMM	Procedure for adoption of amendments between CBS sessions (OBS/WIS/DRMM/DRC (PR-6745))

WMO-No. 306

Chairperson, Publications Board
World Meteorological Organization (WMO)
7 bis, avenue de la Paix
P.O. Box 2300
CH-1211 Geneva 2, Switzerland

Tel.: +41 (0) 22 730 84 03
Fax: +41 (0) 22 730 80 40
E-mail: publications@wmo.int

ISBN 978-92-63-10306-2

12.4.10.5 **When the sky is obscured (N_s = 9), the 8-group shall read 89/h_sh_s, where h_sh_s is the vertical visibility. When the observation of clouds is not made (N = /), the 8-group shall not be included.**

Note: The vertical visibility is defined as the vertical visual range into an obscuring medium.

12.4.10.6 **If two or more types of cloud occur with their bases at the same level and this level is one to be reported in accordance with Regulation 12.4.10.1, the selection for C and N_s shall be made in accordance with the following criteria:**

(a) **If these types do not include cumulonimbus then C shall refer to the cloud type that represents the greatest amount, or if there are two or more types of cloud all having the same amount, the highest applicable code figure for C shall be reported. N_s shall refer to the total amount of cloud whose bases are all at the same level;**

(b) **If these types do include cumulonimbus then one group shall be used to describe only this type with C reported as 9 and N_s as the amount of cumulonimbus. If the total amount of the remaining type(s) of cloud (excluding cumulonimbus) whose bases are all at the same level is greater than that required by Regulation 12.4.10.1, then another group shall be reported with C being selected in accordance with (a) and N_s referring to the total amount of the remaining cloud (excluding cumulonimbus).**

12.4.10.7 **Regulations 12.2.2.2.3 to 12.2.2.2.6, inclusive, shall apply.**

12.4.11 ***Group*** **($9S_PS_Ps_ps_p$)**

The use of this group and the specifications for the supplementary information shall be as specified in Code table 3778.

12.5 Section 4

12.5.1 **The inclusion of this section shall be fixed nationally.**

12.5.2 **Clouds with tops below station level shall be reported only by this section and any coexistent clouds with bases above station level shall be reported in group $8N_hC_LC_MC_H$ of Section 1.**

12.5.3 **C_L clouds with bases below and tops above station level shall be reported in both $8N_hC_LC_MC_H$ and Section 4, provided that the station is out of cloud sufficiently frequently to enable the various features to be recognized. In this case:**

(a) **N_h shall correspond with N´ and C_L with C´ while h shall be coded as /;**

(b) **If the upper surface of the clouds with tops above station level can be observed, it shall be reported by means of H´H´. If the upper surface cannot be observed, H´H´ shall be coded as //;**

(c) **Other C_L clouds present with tops below station level shall be reported in a second N´C´H´H´C_t group;**

(d) **Other C_L clouds present with bases above station level shall be reported in plain language after the N´C´H´H´C_t group.**

12.5.4 **If the station is in almost continuous cloud, Regulation 12.2.7.1 shall apply and Section 4 shall be omitted.**

12.5.5 **When two or more cloud layers with their bases below station level occur at different levels, two or more groups N´C´H´H´C_t shall be used. C_t shall be reported as 9 in the groups indicating the layer of the smaller cloud amount and, in the remaining group, C_t shall be coded in Code table 0552.**

12.5.6 **Rapidly dissipating condensation trails shall not be reported in Section 4.**

Note: See Regulation 12.2.2.2.5.

12.5.7 **The top of persistent condensation trails and cloud masses which have obviously developed from condensation trails shall be reported, using the appropriate C_t code figure.**

FM 15–XV METAR **Aerodrome routine meteorological report (with or without trend forecast**

FM 16–XV SPECI **Aerodrome special meteorological report (with or without trend forecast**

C O D E F O R M :

METAR or **SPECI** **COR** CCCC YYGGgg**Z** **NIL** **AUTO** ddd ff **G** $f_m f_m$ { **KT** or **MPS** } $d_n d_n d_n$ **V** $d_x d_x d_x$

{ VVVV or **CAVOK** } $V_N V_N V_N V_N D_v$ **R** $D_R D_R / V_R V_R V_R V_R$ i w´w´ { $N_s N_s N_s h_s h_s h_s$ or **VV** $h_s h_s h_s$ or **NSC** or **NCD** }

T´T´/T´$_d$T´$_d$ **Q** $P_H P_H P_H P_H$ **RE** w´w´ { **WS R** $D_R D_R$ or **WS ALL RWY** } { (**W** $T_s T_s$ / **S** S´) or (**W** $T_s T_s$ / **H** $H_s H_s H_s$) } (**R** $D_R D_R / E_R C_R e_R e_R B_R B_R$)

{ (TTTTT or **NOSIG**) } TTGGgg ddd ff **G** $f_m f_m$ { **KT** or **MPS** } { VVVV or **CAVOK** } { w´w´ or **NSW** } { $N_s N_s N_s h_s h_s h_s$ or **VV** $h_s h_s h_s$ or **NSC** }

(**RMK** . . . . .)

Notes:

(1) METAR is the name of the code for an aerodrome routine meteorological report. SPECI is the name of the code for an aerodrome special meteorological report. A METAR report and a SPECI report may have a trend forecast appended.

(2) The groups contain a non-uniform number of characters. When an element or phenomenon does not occur, the corresponding group, or the extension of a group, is omitted from a particular report. Detailed instructions are given for each group in the following Regulations. The groups enclosed in brackets are used in accordance with regional or national decisions. Groups may have to be repeated in accordance with the detailed instructions for each group. The code words COR and NIL shall be used, as appropriate, for corrected and missing reports, respectively.

(3) The code form includes a section containing the trend forecast identified either by a change indicator (TTTTT = BECMG or TEMPO as the case may be), or by the code word NOSIG.

(4) The governing criteria for issuing SPECI reports are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Parts I and II.

15.6.4 ***Code word*** **CAVOK**

Regulation 15.10 shall apply.

15.7 Group $\mathbf{R}D_RD_R/V_RV_RV_RV_Ri$

Note: The coding of runway visual range is based on the use of the metre in accordance with the unit specified in ICAO Annex 5.

15.7.1 **During periods when either the horizontal visibility reported in the group VVVV or the runway visual range for one or more runways available for landing is observed to be less than 1 500 metres, one or more groups under Regulation 15.7 shall be included in the report. The letter indicator R followed immediately, without a space, by the runway designator D_RD_R shall always precede the RVR reports.**

15.7.2 **The groups shall be repeated to report runway visual range values for each runway, up to a maximum of four, which is available for landing and for which runway visual range is determined.**

15.7.3 ***Runway designator*** D_RD_R

The designator of each runway for which runway visual range is reported shall be indicated by D_RD_R. Parallel runways should be distinguished by appending to D_RD_R letters L, C or R indicating the left, central or right parallel runway, respectively. The letter(s) shall be appended to D_RD_R as necessary in accordance with the standard practice for runway designation, as laid down by ICAO in Annex 14 – Aerodromes, Volume I – Aerodrome design and operations, paragraphs 5.2.2.4 and 5.2.2.5.

15.7.4 ***Mean value and tendency of runway visual range over the 10-minute period immediately preceding the observation*** $V_RV_RV_RV_Ri$

15.7.4.1 **The runway visual range values to be reported shall be representative of the touchdown zone of the active landing runway(s) up to a maximum of four.**

15.7.4.2 **The mean value of the runway visual range over the 10-minute period immediately preceding the observation shall be reported for $V_RV_RV_RV_R$. However, when the 10-minute period includes a marked discontinuity in the RVR (for example, sudden advection of fog, rapid onset or cessation of an obscuring snow shower), only data after the discontinuity shall be used for obtaining mean RVR values, hence the time interval in these circumstances shall be correspondingly reduced.**

Notes:

(1) **The extreme values of the runway visual range are indicated in accordance with Regulation 15.7.5 and the trend is indicated in accordance with Regulation 15.7.4.3.**

(2) **Any observed value which does not fit the reporting scale in use should be rounded down to the nearest lower step in the scale.**

(3) **A marked discontinuity occurs when there is an abrupt and sustained change in runway visual range, lasting at least two minutes and during which it reaches or passes 800, 550, 300 and 175 m.**

15.7.4.3 **If the runway visual range values during the 10-minute period preceding the observation show a distinct upward or downward tendency such that the mean during the first five minutes varies by 100 metres or more from the mean during the second five minutes of the period, this shall be indicated by i = U for upward and i = D for downward tendency of runway visual range values. When no distinct change in runway visual range is observed, i = N shall be used. When it is not possible to determine the tendency, i shall be omitted.**

15.8.18 **The letter abbreviation SQ shall be used to report squalls when a sudden increase in wind speed is observed of at least 8 m s^{-1} (16 knots), the speed rising to 11 m s^{-1} (22 knots) or more and lasting for at least one minute.**

15.8.19 **When an automatic observing system is used and the present weather cannot be observed, the present weather group shall be replaced by //.**

15.8.20 **Regulation 15.10 shall apply.**

15.9 Group { $N_sN_sN_sh_sh_sh_s$ or **VV**$h_sh_sh_s$ or **NSC** or **NCD** }

15.9.1 ***Cloud amount and cloud height*** $N_sN_sN_sh_sh_sh_s$

15.9.1.1 **Cloud amount, cloud type and height of cloud base shall be reported to describe only the clouds of operational significance, i.e., clouds with the height of base below 1 500 meters (5 000 ft) or below the highest minimum sector altitude, whichever is greater, or cumulonimbus or towering cumulus at any height. The cloud amount $N_sN_sN_s$ shall be reported as few (1 to 2 oktas), scattered (3 to 4 oktas), broken (5 to 7 oktas) or overcast (8 oktas), using the three-letter abbreviations FEW, SCT, BKN and OVC followed, without a space, by the height of the base of the cloud layer (mass) $h_sh_sh_s$. If there are no clouds below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, no cumulonimbus and no towering cumulus and no restriction on vertical visibility, and the abbreviations CAVOK is not appropriate, then the abbreviation NSC shall be used. When an automatic observing system is used and no clouds are detected by that system, the abbreviation NCD shall be used.**

15.9.1.2 **The amount of each cloud layer (mass) shall be determined as if no other clouds were existing.**

15.9.1.3 **The cloud group shall be repeated to report different layers or masses of cloud. The number of groups shall not exceed three, except that significant convective clouds, when observed, shall always be reported.**

Note: The following clouds shall be reported as significant convective clouds:

(a) Cumulonimbus cloud (CB);

(b) Cumulus congestus of great vertical extent (TCU). The contraction TCU, taken from the term "towering cumulus", is an ICAO abbreviation used in aeronautical meteorology to describe this cloud.

15.9.1.4 **The selection of layers or masses of cloud to be reported shall be made in accordance with the following criteria:**

1st group:	**the lowest individual layer (mass) of any amount, to be reported as FEW, SCT, BKN or OVC;**
2nd group:	**the next individual layer (mass) covering more than two oktas, to be reported as SCT, BKN or OVC;**
3rd group:	**the next higher individual layer (mass) covering more than four oktas, to be reported as BKN or OVC;**
Additional groups:	**significant convective clouds (CB or TCU) when observed and not already reported in one of the three groups above.**

The order of reporting the groups shall be from lower to higher levels.

15.9.1.5 **The height of cloud base shall be reported in steps of 30 m (100 ft) up to 3 000 m (10 000 ft). Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.**

Note deleted

15.9.1.6 **When cumulonimbus clouds or towering cumulus clouds are detected by the automatic observing system and the cloud amount and/or the height of cloud base cannot be observed, the cloud amount and/or the height of cloud base elements should be replaced by ///.**

15.9.1.7 **Types of cloud other than significant convective clouds shall not be identified. Significant convective clouds, when observed, shall be identified by appending the letter abbreviations CB (cumulonimbus) or TCU (cumulus congestus of great vertical extent), as appropriate, to the cloud group without a space. When an automatic observing system is used and the cloud type cannot be observed by that system, the cloud type in each cloud group shall be replaced by ///.**

Note: When an individual layer (mass) of cloud is composed of cumulonimbus and towering cumulus clouds with a common cloud base, the type of cloud should be reported as cumulonimbus only and the amount of clouds shall be encoded as the sum of the CB and TCU amounts.

15.9.2 ***Vertical visibility*** **VV$h_sh_sh_s$**

When the sky is obscured and information on vertical visibility is available, the group VV$h_sh_sh_s$ shall be reported, where $h_sh_sh_s$ is the vertical visibility in units of 30 metres (hundreds of feet). When information on vertical visibility is not available due to a temporary failure of a sensor or system, the group shall read VV///.

Notes:

(1) The vertical visibility is defined as the vertical visual range into an obscuring medium.

(2) See Note (2) to Regulation 15.7.4.2.

15.9.3 **Regulation 15.10 shall apply.**

15.10 Code word CAVOK

The code word CAVOK shall be included in place of the groups under Regulations 15.6, 15.8 and 15.9, when the following conditions occur simultaneously at the time of observation:

(a) Visibility reported in the group VVVV is 10 km or more and criteria for inclusion of the group $V_NV_NV_NV_ND_V$ are not met;

(b) No cloud below 1 500 metres (5 000 ft) or below the highest minimum sector altitude, whichever is greater, and no cumulonimbus and no towering cumulus;

(c) No significant weather phenomena (see Code table 4678).

Note: Highest minimum sector altitude is defined in ICAO PANS-OPS, Part 1 – *Definitions,* as the lowest altitude which may be used under emergency conditions which will provide a minimum clearance of 300 metres (1 000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 nautical miles) radius centred on a radio aid to navigation.

15.11 Group $T'T'/T'_dT'_d$

15.11.1 **The observed air temperature and dew-point temperature rounded to the nearest whole degree Celsius shall be given for $T'T'/T'_dT'_d$. Observed values involving 0.5°C shall be rounded up to the next higher Celsius degree.**

15.11.2 **Rounded whole degree values of air temperature and dew-point temperature of –9°C to +9°C shall be preceded by 0; for example, +9°C shall be reported as 09.**

15.11.3 **Temperatures below 0°C shall be immediately preceded by M, that is minus; for example, –9°C shall be reported as M09 and –0.5°C shall be reported as M00.**

15.13.4 **Supplementary information other than specified by Regulations 15.13.2 and 15.13.3 shall be added only in accordance with regional decision.**

15.13.5 ***Sea-surface temperature and the state of the sea*** **(WTsTs/SS') *or sea-surface temperature and the significant wave height*** **(WTsTs/HHsHsHs)**

15.13.5.1 **The sea-surface temperature shall, by regional agreement, be reported according to the regional ICAO Regulation 15.11. The state of the sea shall be reported in accordance with Code table 3700. The significant wave height shall be reported in decimetres.**

15.13.6 ***State of the runway*** **(RDRDR/ERCReReRBRBR)**

15.13.6.1 **Subject to regional air navigation agreement, information on the state of the runway provided by the appropriate airport authority shall be included. The runway deposits E_R, the extent of runway contamination C_R, the depth of deposit e_Re_R and the estimated surface friction B_RB_R shall be indicated in accordance with code tables 0919, 0519, 1079 and 0366, respectively. The state of the runway group shall be replaced by the abbreviation R/SNOCLO when the aerodrome is closed due to extreme deposit of snow. If contaminations on a single runway or on all runways at an aerodrome have ceased to exist, this should be reported by replacing the last six digits of the group by CLRD//.**

Note: Concerning runway designator D_RD_R, Regulation 15.7.3 applies. Additional code figures 88 and 99 are reported in accordance with the European Air Navigation Plan, FASID, Part III-AOP, Attachment A: Code figure 88 indicates "all runways"; code figure 99 shall be used if a new runway state report is not available in time for dissemination of the appropriate METAR message, in which case the previous runway state report will be repeated.

15.14 Trend forecasts

Note: The governing criteria for issuing trend forecasts are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Parts I and II.

15.14.1 **When included in METAR or SPECI reports, the trend forecasts shall be in coded form.**

15.14.2 **When a change, required to be indicated in accordance with the governing criteria for significant changes, is expected for one or several of the observed elements – wind, horizontal visibility, present weather, clouds or vertical visibility – one of the following change indicators shall be used for TTTTT: BECMG or TEMPO.**

Note: Where possible, values corresponding to the local operating minima should be selected to indicate changes.

15.14.3 **The time group GGgg, preceded without a space by one of the letter indicators TT = FM (from), TL (until) or AT (at), shall be used as appropriate, to indicate the beginning (FM) or the end (TL) of a forecast change, or the time (AT) at which specific forecast condition(s) is (are) expected.**

15.14.4 **The change indicator BECMG shall be used to describe expected changes to meteorological conditions which reach or pass specified threshold criteria at either a regular or irregular rate.**

15.14.5 **Changes in meteorological conditions which reach or pass specified threshold criteria for trend forecasts shall be indicated as follows:**

(a) **When the change is forecast to begin and end wholly within the trend forecast period: by the change indicator BECMG followed by the letter indicators FM and TL respectively with their associated time groups, to indicate the beginning and end of the change (for example, for a trend forecast period from 1000 to 1200 UTC in the form: BECMG FM1030 TL1130);**

(b) **When the change is forecast to occur from the beginning of the trend forecast period and be completed before the end of that period: by the change indicator BECMG followed only by the letter indicator TL and its associated time group (the letter indicator FM and its associated time group being omitted), to indicate the end of the change (for example: BECMG TL1100);**

– **Sandstorm**
– **Thunderstorm (with precipitation);**
– **Other weather phenomena – given in Code table 4678 as agreed by the meteorological authority and air traffic services authority and operators concerned.**

(2) The onset or cessation of the following weather phenomena:

– **Freezing fog;**
– **Low drifting dust, sand or snow;**
– **Blowing dust, sand or snow;**
– **Thunderstorm (without precipitation);**
– **Squall;**
– **Funnel cloud (tornado or waterspout).**

15.14.13 **To indicate the end of significant weather phenomena w´w´, the abbreviation NSW (Nil Significant Weather) shall replace the group w´w´.**

15.14.14 **When no cloud below 1 500 metres (5 000 ft) or the highest minimum sector altitude, whichever is greater, and no cumulonimbus and no towering cumulus are forecast, and CAVOK is not appropriate, the abbreviation NSC shall be used.**

15.14.15 **When none of the elements listed in Regulation 15.14.2 is expected to change significantly as to require a change to be indicated, this shall be indicated by the code word NOSIG. NOSIG (no significant change) shall be used to indicate meteorological conditions which do not reach or pass specified threshold criteria.**

15.15 Group (RMK . . . . .)

The indicator RMK denotes the beginning of a section containing information included by national decision which shall not be disseminated internationally.

FM 50–XIII WINTEM **Forecast upper wind and temperature for aviation**

C O D E F O R M :

SECTION 0	WINTEM	$Y_FY_FG_FG_Fg_Fg_F$ { KMH or KT or MPS			
SECTION 1	$L_a{}^1L_a{}^1l_a{}^1A$	$L_o{}^1L_o{}^1L_o{}^1l_o{}^1B$	$L_o{}^2L_o{}^2L_o{}^2l_o{}^2B$	. . . . .	$L_o{}^iL_o{}^iL_o{}^il_o{}^iB$
	(TROP	$n_tn_tn_t$	$n_tn_tn_t$	. . . . .	$n_tn_tn_t$)
	(MAXW	$n_mn_mn_md_md_mf_mf_mf_m$	$n_mn_mn_md_md_mf_mf_mf_m$	. . . . .	$n_mn_mn_md_md_mf_mf_mf_m$)
	$Fn_1n_1n_1$	ddfffSTT	ddfffSTT	. . . . .	ddfffSTT
	$Fn_2n_2n_2$	ddfffSTT	ddfffSTT	. . . . .	ddfffSTT
	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
	$Fn_kn_kn_k$	ddfffSTT	ddfffSTT	. . . . .	ddfffSTT
	$L_a{}^2L_a{}^2l_a{}^2A$				
	(TROP	$n_tn_tn_t$	$n_tn_tn_t$	. . . . .	$n_tn_tn_t$)
	(MAXW	$n_mn_mn_md_md_mf_mf_mf_m$	$n_mn_mn_md_md_mf_mf_mf_m$	. . . . .	$n_mn_mn_md_md_mf_mf_mf_m$)
	$Fn_1n_1n_1$	ddfffSTT	ddfffSTT	. . . . .	ddfffSTT
	$Fn_2n_2n_2$	ddfffSTT	ddfffSTT	. . . . .	ddfffSTT
	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
	$Fn_kn_kn_k$	ddfffSTT	ddfffSTT	. . . . .	ddfffSTT
	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
	$L_a{}^jL_a{}^jl_a{}^jA$				
	(TROP	$n_tn_tn_t$	$n_tn_tn_t$	. . . . .	$n_tn_tn_t$)
	(MAXW	$n_mn_mn_md_md_mf_mf_mf_m$	$n_mn_mn_md_md_mf_mf_mf_m$	. . . . .	$n_mn_mn_md_md_mf_mf_mf_m$)
	$Fn_1n_1n_1$	ddfffSTT	ddfffSTT	. . . . .	ddfffSTT
	$Fn_2n_2n_2$	ddfffSTT	ddfffSTT	. . . . .	ddfffSTT
	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
	$Fn_kn_kn_k$	ddfffSTT	ddfffSTT	. . . . .	ddfffSTT

Notes:

(1) WINTEM is the name of the code used to provide forecast upper wind and temperature for aviation.

(2) The forecast data are valid at the points of a rectangular geographical grid.

(3) A WINTEM message is identified by the word WINTEM.

(4) The code form is divided in two sections as follows:

Section number	*Contents*
0	Identification and time of validity of forecast data
1	Grid-point coordinates and data groups for tropopause height, level of maximum wind and specified flight levels

(5) No aeronautical requirement for this code form is stated by ICAO for international air navigation in ICAO Annex 3/WMO *Technical Regulations* (WMO-No. 49), Volume II, Parts I and II.

FM 51–XV TAF **Aerodrome forecast**

CODE FORM:

{**TAF AMD** or **TAF COR** or **TAF**} CCCC YYGGgg**Z** {**NIL** or $Y_1Y_1G_1G_1/Y_2Y_2G_2G_2$} {ddd**G**$f_mf_m$ or **CNL**} {**KT** or **MPS**}

{VVVV w'w' or **CAVOK**} {$N_sN_sN_sh_sh_sh_s$ or **VV**$h_sh_sh_s$ or **NSC**}

(**TX**T_FT_F/$Y_FY_FG_FG_F$**Z** **TN**T_FT_F/$Y_FY_FG_FG_F$**Z**)

{{**PROB** C_2C_2 or **PROB** C_2C_2 TTTTT or TTTTT or TTYYGGgg} YYGG/$Y_eY_eG_eG_e$} ddd**G**f_mf_m {**KT** or **MPS**} {VVVV or **CAVOK**} {w'w' or **NSW**} {$N_sN_sN_sh_sh_sh_s$ or **VV**$h_sh_sh_s$ or **NSC**}

Notes:

(1) TAF is the name of the code for an aerodrome forecast.

(2) Owing to the variability of meteorological elements in space and time, to limitations of forecasting techniques and to limitations caused by the definitions of some of the elements, the specific value of any of the elements given in a forecast shall be understood by the recipient to be the most probable value which the element is likely to assume during the period of the forecast. Similarly, when the time of occurrence or change of an element is given in a forecast, this time shall be understood to be the most probable time.

(3) The groups enclosed in brackets are used in accordance with regional air navigation agreements.

(4) Aerodrome forecasts are dealt with in the *Technical Regulations* (WMO-No. 49), Volume II, Parts I and II.

(5) The code words "AMD", "CNL", "COR" and "NIL" shall be included, as appropriate, for amended, cancelled, corrected and missing forecasts, respectively.

REGULATIONS:

51.1 General

51.1.1 **The code name TAF shall be included at the beginning of each individual aerodrome forecast.**

51.1.2 **The group YYGGgg**Z **shall be included in each individual forecast to report the date and time of origin of forecast.**

51.1.3 **The description of forecast conditions shall contain at least information about wind, visibility, weather and cloud or vertical visibility.**

51.1.4 **The forecast shall cover the period $Y_1Y_1G_1G_1$ to $Y_2Y_2G_2G_2$. The forecast period may be divided into two or more self-contained parts by the use of the time indicator group TTYYGGgg in the form of FMYYGGgg. A complete description of the forecast prevailing conditions shall be given at the beginning of the forecast or the self-contained parts designated by FMYYGGgg. If any element is expected to change significantly during the forecast period or a self-contained part thereof, one or more sets of change groups TTTTT YYGG/$Y_eY_eG_eG_e$ shall be added after the complete description of the conditions prevailing before the change. Each change group shall be followed by the modified elements subject to Regulation 51.1.5.**

Notes:

(1) The governing criteria for inclusion of change groups are specified in the *Technical Regulations* (WMO-No. 49), Volume II, Parts I and II.

(2) See Regulation 51.8.1.

51.1.5 **The group w´w´ and/or the group $N_sN_sN_sh_sh_sh_s$ or $\mathbf{VV}h_sh_sh_s$ shall be omitted if the corresponding element(s) is (are) expected to be absent or not significant. After change groups TTTTT YYGG/$Y_eY_eG_eG_e$, elements shall be omitted if they are not expected to differ significantly from the preceding values they possessed in the coded forecast (see Regulations 51.5.2 and 51.6.3). However, in case of significant change of the clouds, all cloud groups, including any significant layer(s) or masses not expected to change, shall be given.**

51.2 Group CCCC

51.2.1 **ICAO location indicators shall be used.**

51.2.2 **When the same forecast in a TAF bulletin applies to more than one aerodrome, a separate forecast shall be issued for each aerodrome concerned. Only one indicator CCCC shall prefix each coded forecast.**

51.3 Group dddff**G**f_mf_m { **KT** or **MPS**

51.3.1 **The mean direction and speed of the forecast wind shall be indicated by dddff immediately followed, without a space, by one of the letter code indicators KT or MPS, as the case may be.**

Notes:

(1) KT and MPS are the standard ICAO abbreviations for knots and metre per second, respectively.

(2) The primary unit prescribed in ICAO Annex 5 for wind speed is the metre per second (MPS), with the knot (KT) permitted for use as a non-SI alternative unit until a termination date is decided.

51.3.2 **Regulations 15.5.2 and 15.5.4 shall apply.**

51.3.3 **ddd shall normally be encoded as VRB only when the mean wind speed is less than 1.5 m s^{-1} (3 knots). A variable wind at higher speeds shall be indicated only when it is impossible to forecast a single wind direction.**

51.3.4 **When it is forecast that the maximum wind speed will exceed the mean speed by 5 m s^{-1} (10 knots) or more, the maximum wind speed shall be indicated by adding Gf_mf_m immediately after dddff.**

Note: If after a change group the wind is reported again, Gf_mf_m should be included, or not, in accordance with these same criteria.

51.3.5 **Regulation 15.5.6 shall apply.**

51.4 Group VVVV

Note: The coding of visibility is based on the use of the metre and kilometre, in accordance with the units specified in ICAO Annex 5.

51.4.1 **When the horizontal visibility is forecast not to be the same in different directions, the prevailing visibility shall be given for VVVV. When the prevailing visibility cannot be forecast, the group VVVV shall be used to forecast the minimum visibility.**

51.4.2 **Regulation 51.7 shall apply.**

51.4.3 **Values to indicate forecast visibility shall be in conformity with those set out in Regulation 15.6.3.**

51.6.1.5 **The height of the base of forecast cloud layer (mass) shall be coded in units of 30 metres (100 ft) in the form $h_sh_sh_s$.**

51.6.1.6 **Types of forecast clouds other than cumulonimbus clouds and towering cumulus clouds shall not be given. Cumulonimbus clouds and towering cumulus clouds when expected shall be indicated by appending the letter abbreviations CB and TCU, respectively, to the cloud group without a space. In case CB and TCU are forecast with the same height of cloud base, the cloud amount shall be the sum of the CB and TCU amounts and the cloud type given as CB.**

51.6.2 ***Vertical visibility*** **$VVh_sh_sh_s$**

When the sky is expected to be obscured and clouds cannot be forecast and information on vertical visibility is available, the group $VVh_sh_sh_s$ shall be used in lieu of $N_sN_sN_sh_sh_sh_s$, where $h_sh_sh_s$ shall be the vertical visibility in units of 30 metres (hundreds of feet).

Note: See Note (1) to Regulation 15.9.2.

51.6.3 **Cloud information shall be limited to cloud of operational significance, i.e. cloud below 1 500 metres (5 000 ft) or below the highest minimum sector altitude, whichever is greater, and cumulonimbus and/or towering cumulus whenever forecast. In applying this limitation, when no cumulonimbus and no towering cumulus and no cloud below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, are forecast, and CAVOK is not appropriate, the abbreviation NSC shall be used.**

51.6.4 **Regulation 51.7 shall apply.**

51.7 Code word CAVOK

When it is expected that the following conditions will apply simultaneously, the code word CAVOK shall be included in place of the groups VVVV, w´w´ and $N_sN_sN_sh_sh_sh_s$ or $VVh_sh_sh_s$:

(a) **Visibility: 10 km or more;**

(b) **No cloud below 1 500 metres (5 000 ft) or below the highest minimum sector altitude, whichever is greater, and no cumulonimbus and no towering cumulus;**

(c) **No significant weather phenomena (see Code table 4678).**

Note: See note under Regulation 15.10.

51.8 Groups { TTTTT YYGG/$Y_eY_eG_eG_e$ or TTYYGGgg }

51.8.1 **These groups shall be used when, during the period $Y_1Y_1G_1G_1$ to $Y_2Y_2G_2G_2$, a change in some or all of the elements forecast is expected to occur at some intermediate time YYGGgg or during the period YYGG to $Y_eY_eG_eG_e$. Such groups shall not be introduced until all the data groups necessary to describe the elements forecast in the period $Y_1Y_1G_1G_1$ to $Y_2Y_2G_2G_2$ or YYGGgg have been given.**

Notes:

(1) **If the end of the forecast period is midnight, Y_eY_e should be the date before midnight and G_eG_e should be indicated as 24.**

(2) **See Note (1) to Regulation 51.1.4.**

51.8.2 **The time indicator group TTYYGGgg in the form of FMYYGGgg (from YYGGgg) shall be used to indicate the beginning of a self-contained part of the forecast indicated by YYGGgg. When the group FMYYGGgg is used, all forecast conditions given before the group FMYYGGgg are superseded by the conditions indicated after the group.**

FM 53–X Ext. ARFOR Area forecast for aviation

C O D E F O R M :

SECTION 1	**ARFOR**	(YYGGgg**Z**)	$Y_1Y_1G_1G_1G_2G_2$	{**KMH** or **KT** or **MPS**}	AAAAA	(VVVV)
	($w_1w_1w_1$)	({$N_sN_sN_sh_sh_sh_s$ or **VV** $h_sh_sh_s$ or **SKC** (or **NSC**)})	$7h_th_th_th_th_fh_f$	$6I_ch_ih_ih_it_L$	$5Bh_Bh_Bh_Bt_L$	
	($4h_xh_xh_xT_hT_h$	$d_hd_hf_hf_hf_h$)	($2h'_Ph'_PT_PT_P$)			
SECTION 2	(11111	$QL_aL_aL_oL_o$	$h'_jh'_jf_jf_jf_j$)			
SECTION 3	(22222	$h'_mh'_mf_mf_mf_m$	(d_md_mvv))			
SECTION 4	$9i_3nnn$					

Notes:

(1) ARFOR is the name of the code for an aviation forecast in figure code prepared for a specific area.

(2) See Notes (2) and (3) under FM 51 TAF.

(3) The code form is divided into four sections as follows:

Section number	*Symbolic figure group*	*Contents*
1	—	Code identification and time groups; area forecast
2	11111	Jet-stream data (optional)
3	22222	Data of maximum wind and vertical wind shear (optional)
4	—	Supplementary phenomena

Sections 2, 3 and 4 are not transmitted separately.

(4) No aeronautical requirement for this code form is stated by ICAO for international air navigation in ICAO Annex 3/WMO *Technical Regulations* (WMO-No. 49), Volume II, Parts I and II.

R E G U L A T I O N S :

53.1 Section 1

53.1.1 The code name ARFOR shall appear as a prefix to individual coded area forecasts, followed by the group YYGGggZ, if required.

Note: See Regulation 51.1.2.

53.1.2 The group $Y_1Y_1G_1G_1G_2G_2$ shall be immediately followed, with a space, by the unit of wind speed used and indicated by one of the letter code indicators KMH, KT or MPS, as the case may be.

Notes:

FM 54–X Ext. ROFOR Route forecast for aviation

CODE FORM:

SECTION 1	**ROFOR**	(YYGGgg**Z**)	$Y_1Y_1G_1G_1G_2G_2$	{ **KMH** or **KT** or **MPS** }
	CCCC	($QL_aL_aL_oL_o$)	CCCC	$0i_2zzz$
	(VVVV)	($w_1w_1w_1$)	$N_sN_sN_sh_sh_sh_s$	$7h_th_th_th_fh_fh_f$ $6I_ch_ih_ih_it_L$
	$5Bh_Bh_Bh_Bt_L$	($4h_xh_xh_xT_hT_h$	$d_hd_hf_hf_hf_h$)	($2h'_Ph'_PT_PT_P$)
SECTION 2	(11111	$QL_aL_aL_oL_o$	$h'_jh'_jf_jf_jf_j$)	
SECTION 3	(22222	$h'_mh'_mf_mf_mf_m$	(d_md_mvv))	
SECTION 4	$9i_3nnn$			

Notes:

(1) ROFOR is the name of the code for an aviation forecast in figure code prepared for a route between two specified aerodromes.

(2) See Notes (2) and (3) under FM 51 TAF.

(3) The code form is divided into four sections as follows:

Section number	*Symbolic figure group*	*Contents*
1	—	Code identification and time groups; route forecast
2	11111	Jet-stream data (optional)
3	22222	Data of maximum wind and vertical wind shear (optional)
4	—	Supplementary phenomena

Sections 2, 3 and 4 are not transmitted separately.

(4) No aeronautical requirement for this code is stated by ICAO for international air navigation in ICAO Annex 3/WMO Technical Regulations, Volume II, Parts I and II.

REGULATIONS:

54.1 Section 1

54.1.1 **The code name ROFOR shall appear as a prefix to individual coded route forecasts, followed by the group YYGGggZ, if required.**

Note: See Regulation 51.1.2.

54.1.2 **The forecast shall be considered as valid between the hours G_1G_1 and G_2G_2 at all points or in all sections along the route.**

54.1.3 **The group $Y_1Y_1G_1G_1G_2G_2$ shall be immediately followed, with a space, by the unit of wind speed used and indicated by one of the letter code indicators KMH, KT or MPS, as the case may be.**

Notes:

(1) KMH, KT and MPS are the standard ICAO abbreviations for kilometres per hour, knots and metres per second, respectively.

b_w Sub-area belonging to the area indicated by A_1. (Code table 0161)
(FM 13, FM 18, FM 22, FM 63, FM 64, FM 65)

b_1b_1 }
b_2b_2 } Type of special level. (Code table 0491)
(FM 47, FM 49)

(1) In the case of FM 49 GRAF, b_2b_2 is replaced by 00 in the code form

C Genus of cloud. (Code table 0500)
(FM 12, FM 13, FM 14)

(1) The genus of the cloud of the reported layers shall be determined on the basis of the 10 genera of cloud and of their illustrations given in the *International Cloud Atlas*.

— Total concentration of all ice. (Code table 0501)
(FM 44)

— Genus of cloud predominating in the layer. (Code table 0500)
(FM 45)

C_H Clouds of the genera Cirrus, Cirrocumulus and Cirrostratus. (Code table 0509)
(FM 12, FM 13, FM 14, FM 35, FM 36, FM 38)

(1) The figure to be reported for C_H shall be determined on the basis of the detailed description of C_H clouds and illustrations of them in the *International Cloud Atlas* in conjunction with specifications in Code table 0509.

(2) The figure C_H = 9 shall be used when the predominant C_H clouds are Cirrocumulus although small amounts of Cirrocumulus may be present in the C_H cloud system reported under C_H = 1 to 8.

C_L Clouds of the genera Stratocumulus, Stratus, Cumulus and Cumulonimbus. (Code table 0513)
(FM 12, FM 13, FM 14, FM 35, FM 36, FM 38)

(1) The figure to be reported for C_L shall be determined on the basis of the detailed description of the low clouds and illustrations of them in the *International Cloud Atlas* in conjunction with specifications in Code table 0513.

C_M Clouds of the genera Altocumulus, Altostratus and Nimbostratus. (Code table 0515)
(FM 12, FM 13, FM 14, FM 35, FM 36, FM 38)

(1) The figure to be reported for C_M shall be determined on the basis of the detailed description of C_M clouds and illustrations of them in the *International Cloud Atlas* in conjunction with specifications in Code table 0515.

C_R Extent of runway contamination. (Code table 0519)
(FM 15, FM 16)

C_S Special clouds. (Code table 0521)
(9-group in Section 3 of FM 12, FM 13 and FM 14)

C_a Nature of clouds of vertical development. (Code table 0531)
(9-group in Section 3 of FM 12, FM 13 and FM 14)

D_i — True bearing of principal ice edge. (Code table 0739)
(FM 12, FM 13, FM 14)

(1) If more than one ice edge can be stated, the nearest or most important shall be reported.

D_p — True direction from which the phenomenon indicated is coming. (Code table 0700)
(9-group in Section 3 of FM 12, FM 13 and FM 14)

D_s — True direction of resultant displacement of the ship during the three hours preceding the time of observation. (Code table 0700)
(FM 13)

D_v — Direction of observation given by one or two-letter indicators of the eight points of the compass (N, NE, etc.).
(FM 15, FM 16)

D_w — True orientation of water feature given in W_t. (Code table 0755)
(FM 44)

D_1 — True direction of the point position from the station. (Code table 0700)
(FM 45)

Space added

D_RD_R — Runway designator reported in accordance with ICAO Annex 14.
(FM 15, FM 16)

D_cD_c — Surface current direction, in tens of degrees.
(FM 63)

$D_{gr}D_{gr}$ — Number of days in the month with hail.
(FM 71)

D_tD_t — Dew-point depression at the tropopause level. (Code table 0777)
(FM 35, FM 36, FM 37, FM 38)

$D_{ts}D_{ts}$ — Number of days in the month with thunderstorm(s).
(FM 71)

D_0D_0
D_1D_1
. . .
D_nD_n — Dew-point depression at standard isobaric surfaces or at significant levels, starting with station level. (Code table 0777)
(FM 35, FM 36, FM 37, FM 38)

DDD — Ice thickness, in centimetres.
(FM 67)

$\overline{D_0D_0D_0}$
$\overline{D_1D_1D_1}$
. . .
$\overline{D_nD_nD_n}$ — Monthly mean dew-point depression, in tenths of a degree Celsius, at specified isobaric surfaces starting with station level.
(FM 75, FM 76)

$D_1D_1D_1$
$D_2D_2D_2$
etc. — True direction, in whole degrees, of source.
(FM 81)

$\overline{P_1P_1}$, $\overline{P_2P_2}$, . . .
$\overline{P'_1P'_1}$, $\overline{P'_2P'_2}$, . . .
$\overline{P''_1P''_1}$, $\overline{P''_2P''_2}$, . . .
. . . . . .

Monthly mean pressures in oceanic areas.
(FM 73)

(1) For units of pressure, see Regulation 73.5.1.

PPP — Pressure, in whole hectopascals.
(FM 46)

$P_aP_aP_a$ — Pressure at the level at which the aircraft is flying, in hectopascals.
(FM 41)

(1) This pressure is the one which corresponds, in the ICAO standard atmosphere, to the ICAO flight level indicated in the report received from the aircraft. It is the actual pressure at which the aircraft is flying.

$P_cP_cP_c$ — Pressure, in whole hectopascals, at the average cloud top, of the cloud cover as determined by the sounding instruments.
(FM 86, FM 87)

$P_mP_mP_m$ — Pressure at the maximum wind level.
(FM 32, FM 33, FM 34, FM 35, FM 36, FM 37, FM 38)

(1) The pressure of surfaces up to and including the 100-hPa surface shall be reported in whole hectopascals. Above the 100-hPa surface, pressure shall be reported in tenths of a hectopascal.

$P_sP_sP_s$ — Pressure, in hectopascals, of standard constant pressure surface in which the line of maximum wind speed is given.
(FM 45)

$P_tP_tP_t$ — Pressure at the tropopause level.
(FM 35, FM 36, FM 37, FM 38, FM 86)

(1) See Note (1) under $P_mP_mP_m$.

$P_{wa}P_{wa}P_{wa}$ — Period of waves, obtained by instrumental methods, in tenths of a second.
(FM 18)

(1) $P_{wa}P_{wa}P_{wa}$ shall be reported in addition to $P_{wa}P_{wa}$ when the following conditions have been met:

(a) The sea is not calm (i.e. $P_{wa}P_{wa}H_{wa}H_{wa}$ has not been reported as 0000);

(b) $P_{wa}P_{wa}$ has not been reported as //;

(c) The station has the capability of accurately measuring instrumental wave period in units of 0.1 second.

(2) See Notes (1) and (2) under P_wP_w.

$P_0P_0P_0$
$P_1P_1P_1$
. . .
$P_nP_nP_n$

Pressure at specified levels.
(FM 32, FM 33, FM 34, FM 35, FM 36, FM 37, FM 38)

(1) See Note (1) under $P_mP_mP_m$.

$\overline{P_0P_0P_0}$ — Monthly mean surface pressure, in whole hectopascals, omitting the thousands digit at the time of release of the radiosonde.
(FM 75, FM 76)

r_2r_2 Second normalized polar coordinate derived from Fourier coefficients.
(FM 65)

rrr Range, in intervals of 5 km, for echoes at distances of 500 km or more.
(FM 20)

rrrrrrr Reference value used as new zero for the parameter indicated by $a_1a_1a_1$ or $a_2a_2a_2$, in the same units as used for the parameter concerned.
(FM 47, FM 49)

S State of the sea. (Code table 3700)
(9-group in Section 3 of FM 12, FM 13 and FM 14, FM 61)

Indent

(1) The state of the sea is the state of agitation of the sea resulting from various factors such as wind, swell, currents, angle between swell and wind, etc.

— Sign of temperature (P = positive or zero, M = negative).
(FM 50)

S_C Shape and definition of the eye of the tropical cyclone. (Code table 3704)
(FM 20)

S_h Type of temperature and height data. (Code table 3738)
(FM 41)

— Sign of the pressure altitude.
(FM 42)

(1) If pressure altitude is zero or positive (aircraft is at or above the standard datum plane of 1013.2 hPa), S_h shall be encoded as the letter F.

(2) If pressure altitude is negative (aircraft is below the standard datum plane of 1013.2 hPa), S_h shall be encoded as the letter A.

S_i Stage of development. (Code table 3739)
(FM 12, FM 13, FM 14)

S_0 Hoar frost or coloured precipitation. (Code table 3761)
(9-group in Section 3 of FM 12, FM 13 and FM 14)

S_1 Predominant stage of development of ice. (Code table 3763)
(FM 44)

(1) If two or more stages of development are of the same concentration, older stages of development shall have precedence over the younger stages.

— Nature of the zone separated by the line formed by the points following the $2C_sS_1S_2Z_1$ group (part to the right of the line). (Code table 3762)
(FM 45)

S_2 Secondary stage of development of ice. (Code table 3763)
(FM 44)

$\overline{T_xT_xT_x}$ Mean daily maximum air temperature of the month, in tenths of degrees Celsius, its sign being given by s_n.
(FM 71)

$T_{xd}T_{xd}T_{xd}$ Highest daily mean air temperature of the month, in tenths of degrees Celsius, its sign being given by s_n.
(FM 71)

$T_0T_0T_0$
$T_1T_1T_1$
. . .
$T_nT_nT_n$ Temperature, in tenths of degrees Celsius, at specified depths starting with sea surface.
(FM 83)

(1) For negative temperatures, 500 shall be added to the absolute value of the temperature in tenths of degrees Celsius.

$\overline{T_0T_0T_0}$
$\overline{T_1T_1T_1}$
. . .
$\overline{T_nT_nT_n}$ Mean monthly air temperature, in tenths of degrees Celsius, at specified isobaric surfaces starting with station level.
(FM 75, FM 76)

(1) For negative temperatures, 500 shall be added to the absolute value of the mean temperature, omitting the thousands digit for temperature equal to or less than – 50.0° Celsius.

$T_0T_0T_0T_0$
$T_1T_1T_1T_1$
. . .
$T_nT_nT_nT_n$ Temperatures, in hundredths of degrees Celsius, at either significant or selected depths starting with sea surface.
(FM 18, FM 64)

(1) For negative temperatures, 5000 shall be added to the absolute value of the temperature equal in degrees ° Celsius.

TTTTT Change indicators of trend forecasts and aerodrome forecasts (BECMG, TEMPO).
(FM 15, FM 16, FM 51)

(1) Specifications for these change indicators are given in the *Technical Regulations (*WMO-No. 49, Volume II, Parts I and II.

t Nature of the temperature reading, the value of which is indicated by $s_nT_tT_tT_t$. (Code table 4001)
(FM 67)

t_E Thickness of the predominant form of ice, snow depth not included. (Code table 4006)
(FM 44)

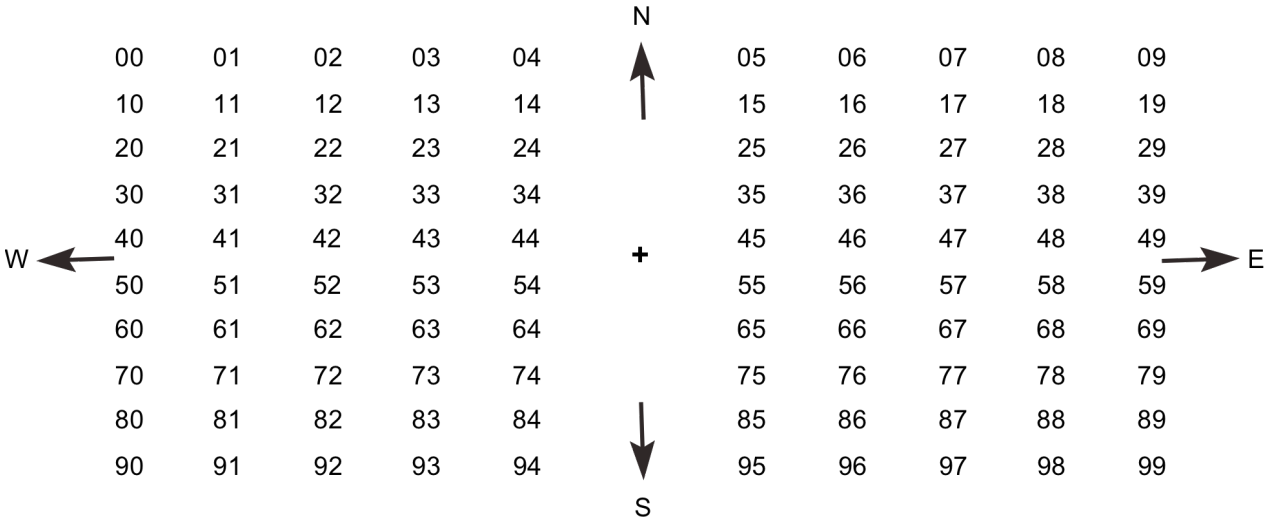
t_L Thickness of layer. (Code table 4013)
(FM 51, FM 53, FM 54)

t_R Duration of period of reference for amount of precipitation, ending at the time of the report. (Code table 4019)
(FM 12, FM 13, FM 14, FM 22)

t_e Time interval over which the movement of the centre or the eye of the tropical cyclone has been calculated. (Code table 4035)
(FM 20)

2776

N_eN_e ***Sequential number of the 60 × 60 km square in the radar coordinate grid***



Note: The cross indicates the radar's location.

2836

n_f ***Number of atmospherics observed by the system at the geographical locations that follow, during a 10-minute period within the hour immediately preceding the time of the report***

Code figure	
0	**1**
1	**2 or 3**
2	**4 to 8**
3	**9 to 15**
4	**16 to 24**
5	**25 to 35**
6	**36 to 48**
7	**49 to 63**
8	**64 to 80**
9	**81 or more**
/	**Not specified**

2863

n_3 ***Evolution of clouds***

Code figure	
0	**No change**
1	**Cumulification**
2	**Slow elevation**
3	**Rapid elevation**
4	**Elevation and stratification**
5	**Slow lowering**
6	**Rapid lowering**
7	**Stratification**
8	**Stratification and lowering**
9	**Rapid change**

3152

P_t ***Type of pressure system***

h_t ***Type of topography system***

Code figure	
0	Complex LOW
1	LOW
2	Secondary
3	Trough
4	Wave
5	HIGH
6	Area of uniform pressure (or height)
7	Ridge
8	Col
9	Tropical storm

3155

P_w ***Period of waves***

Code figure	
0	10 seconds
1	11 seconds
2	12 seconds
3	13 seconds
4	14 seconds or more
5	5 seconds or less
6	6 seconds
7	7 seconds
8	8 seconds
9	9 seconds
/	Calm or period not determined

3300

Q ***Octant of the globe***

Code figure	Longitude	Hemisphere
0	0° – 90°W	northern
1	90° – 180°W	
2	180° – 90°E	
3	90° – 0°E	
5	0° – 90°W	southern
6	90° – 180°W	
7	180° – 90°E	
8	90° – 0°E	

a. METEOROLOGICAL OBSERVING STATIONS

A station index number in the form IIiii is included in the reports of meteorological observations made at land meteorological stations or aboard lightships using land code forms. This group permits the identification of the meteorological station at which the observation has been made.

The station index number is composed of the *block number* (II) and the *station number* (iii).

The block number defines the area in which the reporting station is situated. The station index numbers have been allocated as follows:

Region I:	Africa	60001 – 69998
Region II:	Asia	20001 – 20099 20200 – 21998 23001 – 25998 28001 – 32998 35001 – 36998 38001 – 39998 40350 – 48599 48800 – 49998 50001 – 59998
Region III:	South America	80001 – 88998
Region IV:	North America, Central America and the Caribbean	70001 – 79998
Region V:	South-West Pacific	48600 – 48799 90001 – 98998
Region VI:	Europe	00001 – 19998 20100 – 20199 22001 – 22998 26001 – 27998 33001 – 34998 37001 – 37998 40001 – 40349
Stations in the Antarctic		80001 – 88998

Block numbers are allotted to the services within each Region by regional agreement.

Station numbers (iii) corresponding to a common block number (II) except 89 are usually distributed so that the zone covered by this block number is divided into horizontal strips; e.g., one or several degrees of latitude. Where possible, station numbers within each strip increase from west to east and the first figure of the three-figure station number increases from north to south.

Station index numbers for stations in the Antarctic are allocated by the Secretary-General in accordance with the following scheme:

Each station has an international number 89xxy, where xx indicates the nearest 10° meridian which is numerically lower than the station longitude. For east longitudes, 50 is added; e.g., 89124 indicates a station between 120° and 130°W and 89654 indicates a station between longitudes 150° and 160°E. The figure “y” is allocated roughly according to the latitude of the station with “y” increasing towards the south.

For stations for which international numbers are no longer available within the above scheme, the algorithm will be expanded by adding 20 to xx for west longitudes (range of index numbers 200–380) and 70 for east longitudes (range of index numbers 700–880) to provide new index numbers.

ATTACHMENT I

COMMON CODE TABLES TO BINARY AND ALPHANUMERIC CODES

COMMON CODE TABLE C–1: ***Identification of originating/generating centre***

F_1F_2 for alphanumeric codes

$F_3F_3F_3$ for alphanumeric codes

Code table 0 in GRIB Edition 1/Code table 0 01 033 in BUFR Edition 3

Octet 5 in Section 1 of GRIB Edition 1/Octet 6 in Section 1 of BUFR Edition 3

COMMON CODE TABLE C–2: ***Radiosonde/sounding system used***

Code table 3685 – r_ar_a (Radiosonde/sounding system used) – for alphanumeric codes

Code table 0 02 011 (Radiosonde type) in BUFR

COMMON CODE TABLE C–3: ***Instrument make and type for water temperature profile measurement with fall rate equation coefficients***

Code table 1770 – $I_XI_XI_X$ (Instrument type for XBT, with fall rate equation coefficients) – for alphanumeric codes

Code table 0 22 067 (Instrument type for water temperature/salinity profile measurement) in BUFR

COMMON CODE TABLE C–4: ***Water temperature profile recorder types***

Code table 4770 – X_RX_R (Recorder type) – for alphanumeric codes

Code table 0 22 068 (Water temperature profile recorder types) in BUFR

COMMON CODE TABLE C–5: ***Satellite identifier***

$I_6I_6I_6$ for alphanumeric codes

Code table 0 01 007 in BUFR

Code used in GRIB Edition 2

COMMON CODE TABLE C–6: ***List of international units***

(Used only in Volume I.2, Parts B and C)

COMMON CODE TABLE C–7: ***Tracking technique/status of system used***

Code table 3872 – s_as_a for alphanumeric code

Code table 0 02 014 in BUFR

Code figure for F_1F_2	Code figure for $F_3F_3F_3$	Octet 5 in Section 1 of GRIB Edition 1 Octet 6 in Section 1 of BUFR Edition 3	
Not applicable	226	226	Belarus (NMC)
Not applicable	227	227	Belgium (NMC)
Not applicable	228	228	Bosnia and Herzegovina (NMC)
Not applicable	229	229	Bulgaria (NMC)
Not applicable	230	230	Cyprus (NMC)
Not applicable	231	231	Estonia (NMC)
Not applicable	232	232	Georgia (NMC)
Not applicable	233	233	Dublin
Not applicable	234	234	Israel (NMC)
Not applicable	235	235	Jordan (NMC)
Not applicable	236	236	Latvia (NMC)
Not applicable	237	237	Lebanon (NMC)
Not applicable	238	238	Lithuania (NMC)
Not applicable	239	239	Luxembourg
Not applicable	240	240	Malta (NMC)
Not applicable	241	241	Monaco
Not applicable	242	242	Romania (NMC)
Not applicable	243	243	Syrian Arab Republic (NMC)
Not applicable	244	244	The former Yugoslav Republic of Macedonia (NMC)
Not applicable	245	245	Ukraine (NMC)
Not applicable	246	246	Republic of Moldova (NMC)
Not applicable	247	247	Operational Programme for the Exchange of weather RAdar information (OPERA) – EUMETNET
Not applicable	248	248	Montenegro (NMC)
Not applicable	249	249	Barcelona Dust Forecast Center
Not applicable	250	250	COnsortium for Small scale MOdelling (COSMO)
Not applicable	251	251	Meteorological Cooperation on Operational NWP (MetCoOp)
Not applicable	252	252	Max Planck Institute for Meteorology (MPI-M)
Not applicable	253	253	Reserved for others centres
Not applicable	254	254	EUMETSAT Operation Centre
Not applicable	255	255	Missing value
Not applicable	256–999	Not applicable	Not used

Notes:

(1) The closed bracket sign) indicates that the corresponding code figure is reserved for the previously named centre.

(2) With GRIB or BUFR, to indicate whether the originating/generating centre is a sub-centre or not, the following procedure should be applied:

In GRIB edition 1, use octet 26 of section 1, or in BUFR edition 3, use octet 5 of section 1, with the following meaning:

Code figure	
0	Not a sub-centre, the originating/generating centre is the centre defined by octet 5 in section 1 of GRIB edition 1, or by octet 6 in section 1 of BUFR edition 3.
1 to 254	Identifier of the sub-centre which is the originating/generating centre. The identifier of the sub-centre is allocated by the associated centre which is defined by octet 5 in section 1 of GRIB edition 1, or by octet 6 in section 1 of BUFR edition 3. The sub-centre identifiers should be supplied to the WMO Secretariat by the associated centre(s) for publication.

(3) For the definitions of sub-centres provided to the WMO Secretariat, see Common code table C-12.

Date of assignment of number (necessary after 30/06/2007)	Code figure for $r_a r_a$ (Code table 3685)	Code figure for BUFR (Code table 0 02 011)	
01/12/2011	15	115	PAZA-12M/Radiotheodolite-UL (Ukraine)
01/12/2011	16	116	PAZA-22/AVK-1 (Ukraine)
02/05/2012	17	117	Graw DFM-09 (Germany)
	18	118	Not vacant
Needed	19	119	Vacant
	20–21	120–121	Not vacant
02/05/2012	22	122	Meisei RS-11G GPS radiosonde w/thermistor, capacitance relative humidity sensor, and derived pressure from GPS height (Japan)
03/11/2011	23	123	Vaisala RS41/DigiCORA MW41 (Finland)
03/11/2011	24	124	Vaisala RS41/AUTOSONDE (Finland)
03/11/2011	25	125	Vaisala RS41/MARWIN MW32 (Finland)
07/05/2014	26	126	Meteolabor SRS-C34/Argus 37 (Switzerland)
	27	127	Not vacant
15/09/2011	28	128	AVK – AK2-02 (Russian Federation)
15/09/2011	29	129	MARL-A or Vektor-M – AK2-02 (Russian Federation)
01/01/2010	30	130	Meisei RS-06G (Japan)
03/11/2011	31	131	Taiyuan GTS1-1/GFE(L) (China)
03/11/2011	32	132	Shanghai GTS1/GFE(L) (China)
03/11/2011	33	133	Nanjing GTS1-2/GFE(L) (China)
Needed	34	134	Vacant
07/05/2014	35	135	Meisei iMS-100 GPS radiosonde w/thermistor sensor, capacitance relative humidity sensor, and derived pressure form GPS height (Japan)
Needed	36	136	Vacant
	37	137	Not vacant
Needed	38–40	138–140	Vacant
03/11/2011	41	141	Vaisala RS41 with pressure derived from GPS height/DigiCORA MW41 (Finland)
03/11/2011	42	142	Vaisala RS41 with pressure derived from GPS height/ AUTOSONDE (Finland)
07/05/2014	43	143	NanJing Daqiao XGP-3G (China) *
07/05/2014	44	144	TianJin HuaYunTianYi GTS(U)1 (China)*
07/05/2014	45	145	Beijing Changfeng CF-06 (China)*
07/05/2014	46	146	Shanghai Changwang GTS3 (China)*
	47	147	Not vacant
02/05/2012	48	148	PAZA-22M/MARL-A
	49	149	Not vacant
Needed	50	150	Vacant
	51	151	Not vacant
03/11/2011	52	152	Vaisala RS92-NGP/Intermet IMS-2000 (United States)
	53–59	153–159	Not vacant

* All GPS radiosondes are with thermistor, silicon piezoresistive pressure sensor or pressure derived from GPS height, capacitive relative humidity sensor and wind derived from GPS height.

Date of assignment of number (necessary after 30/06/2007)	Code figure for $r_a r_a$ (Code table 3685)	Code figure for BUFR (Code table 0 02 011)	
Needed	60	160	Vacant
	61	161	Not vacant
Needed	62–66	162–166	Vacant
	67–72	167–172	Not vacant
Needed	73	173	Vacant
	74–76	174–176	Not vacant
15/03/2010	77	177	Modem GPSonde M10 (France)
	78–81	178–181	Not vacant
07/11/2012	82	182	Lockheed Martin LMS-6 w/chip thermistor; external boom mounted polymer capacitive relative humidity sensor; capacitive pressure sensor and GPS wind
07/11/2012	83	183	Vaisala RS92-D/Intermet IMS 1500 w/silicon capacitive pressure sensor, capacitive wire temperature sensor, twin thin-film heated polymer capacitive relative humidity sensor and RDF wind
Needed	84	184	Vacant
	85–89	185–189	Not vacant
	Not available	190–196	Reserved for BUFR only
	97–99	197–199	Not vacant
	Not available	200–254	Reserved for BUFR only
		255	Missing value

Notes:

(1) References to countries in brackets indicate the manufacturing location rather than the country using the instrument.

(2) Some of the radiosondes listed are no longer in use but are retained for archiving purposes.

(3) The alphanumeric code format reports only 2 digits, and the first digit for BUFR is identified from the date: the first digit is 0 if the introduction of the radiosonde for observation was before 30 June 2007, or 1 otherwise. Entries in the second part of the table (after 99), which are declared “Vacant” can be used for new radiosondes because the 2-digit number was originally attributed to sondes, which are no longer used. *This system has been adopted to accommodate reporting in TEMP traditional alphanumeric code format up to the time BUFR is fully used for radiosounding reports*.

COMMON CODE TABLE C–3: ***Instrument make and type for water temperature profile measurement with fall rate equation coefficients***

Common Code table { Code table 1770 – $I_XI_XI_X$ (Instrument type for XBT, with fall rate equation coefficients) – for alphanumeric codes
Code table 0 22 067 (Instrument type for water temperature/salinity profile measurement) in BUFR

Code figure for $I_XI_XI_X$	Code figure for BUFR (Code table 022 067)	Meaning: Instrument make and type	Meaning: Equation coefficients *a*	Meaning: Equation coefficients *b*
001	1	Sippican T-4	6.472	–2.16
002	2	Sippican T-4	6.691	–2.25
011	11	Sippican T-5	6.828	–1.82
021	21	Sippican Fast Deep	6.346	–1.82
031	31	Sippican T-6	6.472	–2.16
032	32	Sippican T-6	6.691	–2.25
041	41	Sippican T-7	6.472	–2.16
042	42	Sippican T-7	6.691	–2.25
051	51	Sippican Deep Blue	6.472	–2.16
052	52	Sippican Deep Blue	6.691	–2.25
061	61	Sippican T-10	6.301	–2.16
071	71	Sippican T-11	1.779	–0.255
081	81	Sippican AXBT (300m probes)	1.52	0.0
201	201	TSK T-4	6.472	–2.16
202	202	TSK T-4	6.691	–2.25
211	211	TSK T-6	6.472	–2.16
212	212	TSK T-6	6.691	–2.25
221	221	TSK T-7	6.472	–2.16
222	222	TSK T-7	6.691	–2.25
231	231	TSK T-5	6.828	–1.82
241	241	TSK T-10	6.301	–2.16
251	251	TSK Deep Blue	6.472	–2.16
252	252	TSK Deep Blue	6.691	–2.25
261	261	TSK AXBT		
401	401	Sparton XBT-1	6.301	–2.16
411	411	Sparton XBT-3	5.861	–0.0904
421	421	Sparton XBT-4	6.472	–2.16
431	431	Sparton XBT-5	6.828	–1.82
441	441	Sparton XBT-5DB	6.828	–1.82
451	451	Sparton XBT-6	6.472	–2.16
461	461	Sparton XBT-7	6.472	–2.16
462	462	Sparton XBT-7	6.705	–2.28
471	471	Sparton XBT-7DB	6.472	–2.16
481	481	Sparton XBT-10	6.301	–2.16
491	491	Sparton XBT-20	6.472	–2.16
501	501	Sparton XBT-20DB	6.472	–2.16
510	510	Sparton 536 AXBT	1.524	0
700	700	Sippican XCTD Standard		
710	710	Sippican XCTD Deep		
720	720	Sippican AXCTD		

COMMON CODE TABLE C–5: *Satellite identifier*

Common Code table { $I_6I_6I_6$ for alphanumeric codes; Code table 0 01 007 in BUFR; Code used in GRIB Edition 2

Code figure for $I_6I_6I_6$	Code figure for BUFR (Code table 0 01 007)	Code figure for GRIB Edition 2	
000	0	0	Reserved
	001–099: Numbers allocated to Europe		
001	1	1	ERS 1
002	2	2	ERS 2
003	3	3	METOP-1 (Metop-B)
004	4	4	METOP-2 (Metop-A)
005	5	5	METOP-3 (Metop-C)
020	20	20	SPOT 1
021	21	21	SPOT 2
022	22	22	SPOT 3
023	23	23	SPOT 4
040	40	40	OERSTED
041	41	41	CHAMP
042	42	42	TerraSAR-X
043	43	43	TanDEM-X
044	44	44	PAZ
046	46	46	SMOS
047	47	47	CryoSat-2
048	48	48	AEOLUS
050	50	50	METEOSAT 3
051	51	51	METEOSAT 4
052	52	52	METEOSAT 5
053	53	53	METEOSAT 6
054	54	54	METEOSAT 7
055	55	55	METEOSAT 8
056	56	56	METEOSAT 9
057	57	57	METEOSAT 10
058	58	58	METEOSAT 1
059	59	59	METEOSAT 2
060	60	60	ENVISAT
061	61	61	Sentinal 3A
070	70	70	METEOSAT 11
	100–199: Numbers allocated to Japan		
120	120	120	ADEOS
121	121	121	ADEOS II
122	122	122	GCOM-W1
140	140	140	GOSAT
150	150	150	GMS 3
151	151	151	GMS 4
152	152	152	GMS 5

Code figure for $I_6I_6I_6$	Code figure for BUFR (Code table 0 01 007)	Code figure for GRIB Edition 2	
153	153	153	GMS
154	154	154	GMS 2
171	171	171	MTSAT-1R
172	172	172	MTSAT-2
173	173	173	Himawari-8
174	174	174	Himawari-9
	200–299: Numbers allocated to the United States		
200	200	200	NOAA 8
201	201	201	NOAA 9
202	202	202	NOAA 10
203	203	203	NOAA 11
204	204	204	NOAA 12
205	205	205	NOAA 14
206	206	206	NOAA 15
207	207	207	NOAA 16
208	208	208	NOAA 17
209	209	209	NOAA 18
220	220	220	LANDSAT 5
221	221	221	LANDSAT 4
222	222	222	LANDSAT 7
223	223	223	NOAA 19
224	224	224	NPP
240	240	240	DMSP 7
241	241	241	DMSP 8
242	242	242	DMSP 9
243	243	243	DMSP 10
244	244	244	DMSP 11
245	245	245	DMSP 12
246	246	246	DMSP 13
247	247	247	DMSP 14
248	248	248	DMSP 15
249	249	249	DMSP 16
250	250	250	GOES 6
251	251	251	GOES 7
252	252	252	GOES 8
253	253	253	GOES 9
254	254	254	GOES 10
255	255	255	GOES 11
256	256	256	GOES 12
257	257	257	GOES 13
258	258	258	GOES 14
259	259	259	GOES 15
260	260	260	JASON 1
261	261	261	JASON 2

Code figure for $I_6I_6I_6$	Code figure for BUFR (Code table 0 01 007)	Code figure for GRIB Edition 2	
281	281	281	QUIKSCAT
282	282	282	TRMM
283	283	283	CORIOLIS
285	285	285	DMSP 17
286	286	286	DMSP 18
287	287	287	DMSP 19
288	288	288	GPM-core
300–399: Numbers allocated to the Russian Federation			
310	310	310	GOMS 1
311	311	311	GOMS 2
320	320	320	METEOR 2-21
321	321	321	METEOR 3-5
322	322	322	METEOR 3M-1
323	323	323	METEOR 3M-2
341	341	341	RESURS 01-4
400–499: Numbers allocated to India			
410	410	410	KALPANA-1
421	421	421	Oceansat-2
430	430	430	INSAT 1B
431	431	431	INSAT 1C
432	432	432	INSAT 1D
440	440	440	Megha-Tropiques
441	441	441	SARAL
450	450	450	INSAT 2A
451	451	451	INSAT 2B
452	452	452	INSAT 2E
470	470	470	INSAT 3A
471	471	471	INSAT 3D
472	472	472	INSAT 3E
500–599: Numbers allocated to China			
500	500	500	FY–1C
501	501	501	FY–1D
510	510	510	FY–2
512	512	512	FY-2B
513	513	513	FY-2C
514	514	514	FY-2D
515	515	515	FY-2E
516	516	516	FY-2F
517	517	517	FY-2G
520	520	520	FY-3A
521	521	521	FY-3B
522	522	522	FY-3C
600–699: Numbers allocated to Europe			
700–799: Numbers allocated to the United States			
700	700	700	TIROS M (ITOS 1)
701	701	701	NOAA 1

Code figure for $I_XI_XI_X$	Code figure for BUFR (Code table 022 067)	Meaning: Instrument make and type	Equation coefficients: *a*	*b*
857	857	Profiling float, NINJA, FSI conductivity sensor	Not applicable	
858	858	Profiling float, NINJA, TSK conductivity sensor	Not applicable	
859	859	Profiling float, NEMO, no conductivity sensor	Not applicable	
860	860	Profiling float, NEMO, SBE conductivity sensor	Not applicable	
861	861	Profiling float, NEMO, FSI conductivity sensor	Not applicable	
862	862	SOLO_D, SBE conductivity sensor		
863	863	NAVIS-A, SBE conductivity sensor		
864	864	NINJA_D, SBE conductivity sensor		
865	865	NOVA, SBE conductivity sensor		
866	866	ALAMO, no conductivity sensor		
867	867	ALAMO, RBR conductivity sensor		
868	868	ALAMO, SBE conductivity sensor		
869–899	869–899	Reserved		
900	900	Sippican LMP-5 XBT	9.727	–0.0000473
901	901	Ice-tethered Profiler (ITP), SBE CTD		
902	902	Brooke ocean moving vessel profiler (MVP)		
903	903	Sea-Bird CTD		
904	904	AML oceanographic CTD		
905	905	Falmouth Scientific CTD		
906	906	Ocean Sensors CTD		
907	907	Valeport CTD		
908	908	Oceanscience MVP		
909	909	IDRONAUT CTD		
910	910	Sea-Bird SBE38		
911–994	911–994	Reserved		
995	995	Instrument attached to marine mammals	Not applicable	
996	996	Instrument attached to animals other than marine mammals	Not applicable	
997–999	997–999	Reserved		
	1000–1022	Reserved		
	1023	Missing value		

Notes:

(1) The depth is calculated from coefficients *a* and *b* and the time *t* as follows: $z = at + 10^{-3}bt^2$.

(2) All unassigned numbers are reserved for future use.

(3) The values of *a* and *b* are supplied for information only.

COMMON CODE TABLE C–7: ***Tracking technique/status of system used***

Common Code table { Code table 3872 – $s_a s_a$ for alphanumeric codes
Code table 0 02 014 in BUFR

Code figure for $s_a s_a$	Code figure for BUFR (Code table 0 02 014)	
00	0	No windfinding
01	1	Automatic with auxiliary optical direction finding
02	2	Automatic with auxiliary radio direction finding
03	3	Automatic with auxiliary ranging
04	4	Not used
05	5	Automatic with multiple VLF-Omega signals
06	6	Automatic cross chain Loran-C
07	7	Automatic with auxiliary wind profiler
08	8	Automatic satellite navigation
09–18	9–18	Reserved
19	19	Tracking technique not specified
		TRACKING TECHNIQUES/STATUS OF ASAP SYSTEM
		STATUS OF SHIP SYSTEM
20	20	Vessel stopped
21	21	Vessel diverted from original destination
22	22	Vessel's arrival delayed
23	23	Container damaged
24	24	Power failure to container
24–28	25–28	Reserved for future use
29	29	Other problems
		SOUNDING SYSTEM
30	30	Major power problems
31	31	UPS inoperative
32	32	Receiver hardware problems
33	33	Receiver software problems
34	34	Processor hardware problems
35	35	Processor software problems
36	36	NAVAID system damaged
37	37	Shortage of lifting gas
38	38	Reserved
39	39	Other problems
		LAUNCH FACILITIES
40	40	Mechanical defect
41	41	Material defect (hand launcher)
42	42	Power failure
43	43	Control failure

Code figure for $s_a s_a$	Code figure for BUFR (Code table 0 02 014)	
44	44	Pneumatic/hydraulic failure
45	45	Other problems
46	46	Compressor problems
47	47	Balloon problems
48	48	Balloon release problems
49	49	Launcher damaged
		DATA ACQUISITION SYSTEM
50	50	R/S receiver antenna defect
51	51	NAVAID antenna defect
52	52	R/S receiver cabling (antenna) defect
53	53	NAVAID antenna cabling defect
54–58	54–58	Reserved
59	59	Other problems
		COMMUNICATIONS
60	60	ASAP communications defect
61	61	Communications facility rejected data
62	62	No power at transmitting antenna
63	63	Antenna cable broken
64	64	Antenna cable defect
65	65	Message transmitted power below normal
66–68	66–68	Reserved
69	69	Other problems
70	70	All systems in normal operation
71–98	71–98	Reserved
99	99	Status of system and its components not specified
	100–126	Reserved
	127	Missing value

JN 141665

www.wmo.int