

ภาคผนวกที่ 7

เอกสารการสอบเทียบความถูกต้องของเครื่องมือ

TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

Sample Location		Date	
Project Site		Start Date	October 23, 2023
Sample Number		Stop Date	01/01/24
Filter Serial Number		Stop Time	01/01/24
Recorder Serial Number		Person	Mr. Patsaron Monthong

Flow No.	Solid (g)		Resonance Comp. Index (g/L)		(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)	(S)	(T)	(U)	(V)	(W)	(X)	(Y)	(Z)	(AA)	(AB)	(AC)	(AD)	(AE)	(AF)	(AG)	(AH)	(AI)	(AJ)	(AK)	(AL)	(AM)	(AN)	(AO)	(AP)	(AQ)	(AR)	(AS)	(AT)	(AU)	(AV)	(AW)	(AX)	(AY)	(AZ)	(BA)	(BB)	(BC)	(BD)	(BE)	(BF)	(BG)	(BH)	(BI)	(BJ)	(BK)	(BL)	(BM)	(BN)	(BO)	(BP)	(BQ)	(BR)	(BS)	(BT)	(BU)	(BV)	(BW)	(BX)	(BY)	(BZ)	(CA)	(CB)	(CC)	(CD)	(CE)	(CF)	(CG)	(CH)	(CI)	(CJ)	(CK)	(CL)	(CM)	(CN)	(CO)	(CP)	(CQ)	(CR)	(CS)	(CT)	(CU)	(CV)	(CW)	(CX)	(CY)	(CZ)	(DA)	(DB)	(DC)	(DD)	(DE)	(DF)	(DG)	(DH)	(DI)	(DJ)	(DK)	(DL)	(DM)	(DN)	(DO)	(DP)	(DQ)	(DR)	(DS)	(DT)	(DU)	(DV)	(DW)	(DX)	(DY)	(DZ)	(EA)	(EB)	(EC)	(ED)	(EE)	(EF)	(EG)	(EH)	(EI)	(EJ)	(EK)	(EL)	(EM)	(EN)	(EO)	(EP)	(EQ)	(ER)	(ES)	(ET)	(EU)	(EV)	(EW)	(EX)	(EY)	(EZ)	(FA)	(FB)	(FC)	(FD)	(FE)	(FF)	(FG)	(FH)	(FI)	(FJ)	(FK)	(FL)	(FM)	(FN)	(FO)	(FP)	(FQ)	(FR)	(FS)	(FT)	(FU)	(FV)	(FW)	(FX)	(FY)	(FZ)	(GA)	(GB)	(GC)	(GD)	(GE)	(GF)	(GG)	(GH)	(GI)	(GJ)	(GK)	(GL)	(GM)	(GN)	(GO)	(GP)	(GQ)	(GR)	(GS)	(GT)	(GU)	(GV)	(GW)	(GX)	(GY)	(GZ)	(HA)	(HB)	(HC)	(HD)	(HE)	(HF)	(HG)	(HH)	(HI)	(HJ)	(HK)	(HL)	(HM)	(HN)	(HO)	(HP)	(HQ)	(HR)	(HS)	(HT)	(HU)	(HV)	(HW)	(HX)	(HY)	(HZ)	(IA)	(IB)	(IC)	(ID)	(IE)	(IF)	(IG)	(IH)	(II)	(IJ)	(IK)	(IL)	(IM)	(IN)	(IO)	(IP)	(IQ)	(IR)	(IS)	(IT)	(IU)	(IV)	(IW)	(IX)	(IY)	(IZ)	(JA)	(JB)	(JC)	(JD)	(JE)	(JF)	(JG)	(JH)	(JI)	(JJ)	(JK)	(JL)	(JM)	(JN)	(JO)	(JP)	(JQ)	(JR)	(JS)	(JT)	(JU)	(JV)	(JW)	(JX)	(JY)	(JZ)	(KA)	(KB)	(KC)	(KD)	(KE)	(KF)	(KG)	(KH)	(KI)	(KJ)	(KK)	(KL)	(KM)	(KN)	(KO)	(KP)	(KQ)	(KR)	(KS)	(KT)	(KU)	(KV)	(KW)	(KX)	(KY)	(KZ)	(LA)	(LB)	(LC)	(LD)	(LE)	(LF)	(LG)	(LH)	(LI)	(LJ)	(LK)	(LL)	(LM)	(LN)	(LO)	(LP)	(LQ)	(LR)	(LS)	(LT)	(LU)	(LV)	(LW)	(LX)	(LY)	(LZ)	(MA)	(MB)	(MC)	(MD)	(ME)	(MF)	(MG)	(MH)	(MI)	(MJ)	(MK)	(ML)	(MN)	(MO)	(MP)	(MQ)	(MR)	(MS)	(MT)	(MU)	(MV)	(MW)	(MX)	(MY)	(MZ)	(NA)	(NB)	(NC)	(ND)	(NE)	(NF)	(NG)	(NH)	(NI)	(NJ)	(NK)	(NL)	(NM)	(NN)	(NO)	(NP)	(NQ)	(NR)	(NS)	(NT)	(NU)	(NV)	(NW)	(NX)	(NY)	(NZ)	(OA)	(OB)	(OC)	(OD)	(OE)	(OF)	(OG)	(OH)	(OI)	(OJ)	(OK)	(OL)	(OM)	(ON)	(OO)	(OP)	(OQ)	(OR)	(OS)	(OT)	(OU)	(OV)	(OW)	(OX)	(OY)	(OZ)	(PA)	(PB)	(PC)	(PD)	(PE)	(PF)	(PG)	(PH)	(PI)	(PJ)	(PK)	(PL)	(PM)	(PN)	(PO)	(PP)	(PQ)	(PR)	(PS)	(PT)	(PU)	(PV)	(PW)	(PX)	(PY)	(PZ)	(QA)	(QB)	(QC)	(QD)	(QE)	(QF)	(QG)	(QH)	(QI)	(QJ)	(QK)	(QL)	(QM)	(QN)	(QO)	(QP)	(QQ)	(QR)	(QS)	(QT)	(QU)	(QV)	(QW)	(QX)	(QY)	(QZ)	(RA)	(RB)	(RC)	(RD)	(RE)	(RF)	(RG)	(RH)	(RI)	(RJ)	(RK)	(RL)	(RM)	(RN)	(RO)	(RP)	(RQ)	(RR)	(RS)	(RT)	(RU)	(RV)	(RW)	(RX)	(RY)	(RZ)	(SA)	(SB)	(SC)	(SD)	(SE)	(SF)	(SG)	(SH)	(SI)	(SJ)	(SK)	(SL)	(SM)	(SN)	(SO)	(SP)	(SQ)	(SR)	(SS)	(ST)	(SU)	(SV)	(SW)	(SX)	(SY)	(SZ)	(TA)	(TB)	(TC)	(TD)	(TE)	(TF)	(TG)	(TH)	(TI)	(TJ)	(TK)	(TL)	(TM)	(TN)	(TO)	(TP)	(TQ)	(TR)	(TS)	(TT)	(TU)	(TV)	(TW)	(TX)	(TY)	(TZ)	(UA)	(UB)	(UC)	(UD)	(UE)	(UF)	(UG)	(UH)	(UI)	(UJ)	(UK)	(UL)	(UM)	(UN)	(UO)	(UP)	(UQ)	(UR)	(US)	(UT)	(UU)	(UV)	(UW)	(UX)	(UY)	(UZ)	(VA)	(VB)	(VC)	(VD)	(VE)	(VF)	(VG)	(VH)	(VI)	(VJ)	(VK)	(VL)	(VM)	(VN)	(VO)	(VP)	(VQ)	(VR)	(VS)	(VT)	(VU)	(VV)	(VW)	(VX)	(VY)	(VZ)	(WA)	(WB)	(WC)	(WD)	(WE)	(WF)	(WG)	(WH)	(WI)	(WJ)	(WK)	(WL)	(WM)	(WN)	(WO)	(WP)	(WQ)	(WR)	(WS)	(WT)	(WU)	(WV)	(WW)	(WX)	(WY)	(WZ)	(XA)	(XB)	(XC)	(XD)	(XE)	(XF)	(XG)	(XH)	(XI)	(XJ)	(XK)	(XL)	(XM)	(XN)	(XO)	(XP)	(XQ)	(XR)	(XS)	(XT)	(XU)	(XV)	(XW)	(XX)	(XY)	(XZ)	(YA)	(YB)	(YC)	(YD)	(YE)	(YF)	(YG)	(YH)	(YI)	(YJ)	(YK)	(YL)	(YM)	(YN)	(YO)	(YP)	(YQ)	(YR)	(YS)	(YT)	(YU)	(YV)	(YW)	(YX)	(YY)	(YZ)	(ZA)	(ZB)	(ZC)	(ZD)	(ZE)	(ZF)	(ZG)	(ZH)	(ZI)	(ZJ)	(ZK)	(ZL)	(ZM)	(ZN)	(ZO)	(ZP)	(ZQ)	(ZR)	(ZS)	(ZT)	(ZU)	(ZV)	(ZW)	(ZX)	(ZY)	(ZZ)	(AA)	(AB)	(AC)	(AD)	(AE)	(AF)	(AG)	(AH)	(AI)	(AJ)	(AK)	(AL)	(AM)	(AN)	(AO)	(AP)	(AQ)	(AR)	(AS)	(AT)	(AU)	(AV)	(AW)	(AX)	(AY)	(AZ)	(BA)	(BB)	(BC)	(BD)	(BE)	(BF)	(BG)	(BH)	(BI)	(BJ)	(BK)	(BL)	(BM)	(BN)	(BO)	(BP)	(BQ)	(BR)	(BS)	(BT)	(BU)	(BV)	(BW)	(BX)	(BY)	(BZ)	(CA)	(CB)	(CC)	(CD)	(CE)	(CF)	(CG)	(CH)	(CI)	(CJ)	(CK)	(CL)	(CM)	(CN)	(CO)	(CP)	(CQ)	(CR)	(CS)	(CT)	(CU)	(CV)	(CW)	(CX)	(CY)	(CZ)	(DA)	(DB)	(DC)	(DD)	(DE)	(DF)	(DG)	(DH)	(DI)	(DJ)	(DK)	(DL)	(DM)	(DN)	(DO)	(DP)	(DQ)	(DR)	(DS)	(DT)	(DU)	(DV)	(DW)	(DX)	(DY)	(DZ)	(EA)	(EB)	(EC)	(ED)	(EE)	(EF)	(EG)	(EH)	(EI)	(EJ)	(EK)	(EL)	(EM)	(EN)	(EO)	(EP)	(EQ)	(ER)	(ES)	(ET)	(EU)	(EV)	(EW)	(EX)	(EY)	(EZ)	(FA)	(FB)	(FC)	(FD)	(FE)	(FF)	(FG)	(FH)	(FI)	(FJ)	(FK)	(FL)	(FM)	(FN)	(FO)	(FP)	(FQ)	(FR)	(FS)	(FT)	(FU)	(FV)	(FW)	(FX)	(FY)	(FZ)	(GA)	(GB)	(GC)	(GD)	(GE)	(GF)	(GG)	(GH)	(GI)	(GJ)	(GK)	(GL)	(GM)	(GN)	(GO)	(GP)	(GQ)	(GR)	(GS)	(GT)	(GU)	(GV)	(GW)	(GX)	(GY)	(GZ)	(HA)	(HB)	(HC)	(HD)	(HE)	(HF)	(HG)	(HH)	(HI)	(HJ)	(HK)	(HL)	(HM)	(HN)	(HO)	(HP)	(HQ)	(HR)	(HS)	(HT)	(HU)	(HV)	(HW)	(HX)	(HY)	(HZ)	(IA)	(IB)	(IC)	(ID)	(IE)	(IF)	(IG)	(IH)	(II)	(IJ)	(IK)	(IL)	(IM)	(IN)	(IO)	(IP)	(IQ)	(IR)	(IS)	(IT)	(IU)	(IV)	(IW)	(IX)	(IY)	(IZ)	(JA)	(JB)	(JC)	(JD)	(JE)	(JF)	(JG)	(JH)	(JI)	(JJ)	(JK)	(JL)	(JM)	(JN)	(JO)	(JP)	(JQ)	(JR)	(JS)	(JT)	(JU)	(JV)	(JW)	(JX)	(JY)	(JZ)	(KA)	(KB)	(KC)	(KD)	(KE)	(KF)	(KG)	(KH)	(KI)	(KJ)	(KK)	(KL)	(KM)	(KN)	(KO)	(KP)	(KQ)	(KR)	(KS)	(KT)	(KU)	(KV)	(KW)	(KX)	(KY)	(KZ)	(LA)	(LB)	(LC)	(LD)	(LE)	(LF)	(LG)	(LH)	(LI)	(LJ)	(LK)	(LM)	(LN)	(LO)	(LP)	(LQ)	(LR)	(LS)	(LT)	(LU)	(LV)	(LW)	(LX)	(LY)	(LZ)	(MA)	(MB)	(MC)	(MD)	(ME)	(MF)	(MG)	(MH)	(MI)	(MJ)	(MK)	(ML)	(MN)	(MO)	(MP)	(MQ)	(MR)	(MS)	(MT)	(MU)	(MV)	(MW)	(MX)	(MY)	(MZ)	(NA)	(NB)	(NC)	(ND)	(NE)	(NF)	(NG)	(NH)	(NI)	(NJ)	(NK)	(NL)	(NM)	(NN)	(NO)	(NP)	(NQ)	(NR)	(NS)	(NT)	(NU)	(NV)	(NW)	(NX)	(NY)	(NZ)	(OA)	(OB)	(OC)	(OD)	(OE)	(OF)	(OG)	(OH)	(OI)	(OJ)	(OK)	(OL)	(OM)	(ON)	(OO)	(OP)	(OQ)	(OR)	(OS)	(OT)	(OU)	(OV)	(OW)	(OX)	(OY)	(OZ)	(PA)	(PB)	(PC)	(PD)	(PE)	(PF)	(PG)	(PH)	(PI)	(PJ)	(PK)	(PL)	(PM)	(PN)	(PO)	(PP)	(PQ)	(PR)	(PS)	(PT)	(PU)	(PV)	(PW)	(PX)	(PY)	(PZ)	(QA)	(QB)	(QC)	(QD)	(QE)	(QF)	(QG)	(QH)	(QI)	(QJ)	(QK)	(QL)	(QM)	(QN)	(QO)	(QP)	(QQ)	(QR)	(QS)	(QT)	(QU)	(QV)	(QW)	(QX)	(QY)	(QZ)	(RA)	(RB)	(RC)	(RD)	(RE)	(RF)	(RG)	(RH)	(RI)	(RJ)	(RK)	(RL)	(RM)	(RN)	(RO)	(RP)	(RQ)	(RR)	(RS)	(RT)	(RU)	(RV)	(RW)	(RX)	(RY)	(RZ)	(SA)	(SB)	(SC)	(SD)	(SE)	(SF)	(SG)	(SH)	(SI)	(SJ)	(SK)	(SL)	(SM)	(SN)	(SO)	(SP)	(SQ)	(SR)	(SS)	(ST)	(SU)	(SV)	(SW)	(SX)	(SY)	(SZ)	(TA)	(TB)	(TC)	(TD)	(TE)	(TF)	(TG)	(TH)	(TI)	(TJ)	(TK)	(TL)	(TM)	(TN)	(TO)	(TP)	(TQ)	(TR)	(TS)	(TT)	(TU)	(TV)	(TW)	(TX)	(TY)	(TZ)	(UA)	(UB)	(UC)	(UD)	(UE)	(UF)	(UG)	(UH)	(UI)	(UJ)	(UK)	(UL)	(UM)	(UN)	(UO)	(UP)	(UQ)	(UR)	(US)	(UT)	(UU)	(UV)	(UW)	(UX)	(UY)	(UZ)	(VA)	(VB)	(VC)	(VD)	(VE)	(VF)	(VG)	(VH)	(VI)	(VJ)	(VK)	(VL)	(VM)	(VN)	(VO)	(VP)	(VQ)	(VR)	(VS)	(VT)	(VU)	(VV)	(VW)	(VX)	(VY)	(VZ)	(WA)	(WB)	(WC)	(WD)	(WE)	(WF)	(WG)	(WH)	(WI)	(WJ)	(WK)	(WL)	(WM)	(WN)	(WO)	(WP)	(WQ)	(WR)	(WS)	(WT)	(WU)	(WV)	(WW)	(WX)	(WY)	(WZ)	(XA)	(XB)	(XC)	(XD)	(XE)	(XF)	(XG)	(XH)	(XI)	(XJ)	(XK)	(XL)	(XM)	(XN)	(XO)	(XP)	(XQ)	(XR)	(XS)	(XT)	(XU)	(XV)	(XW)	(XX)	(XY)	(XZ)	(YA)	(YB)	(YC)	(YD)	(YE)	(YF)	(YG)	(YH)	(YI)	(YJ)	(YK)	(YL)	(YM)	(YN)	(YO)	(YP)	(YQ)	(YR)	(YS)	(YT)	(YU)	(YV)	(YW)	(YX)	(YZ)	(ZA)	(ZB)	(ZC)	(ZD)	(ZE)	(ZF)	(ZG)	(ZH)	(ZI)	(ZJ)	(ZK)	(ZL)	(ZM)	(ZN)	(ZO)	(ZP)	(ZQ)	(ZR)	(ZS)	(ZT)	(ZU)	(ZV)	(ZW)	(ZX)	(ZY)	(ZZ)
										C = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+Q+R+S+T+U+V+X+Y+Z)										r = (P+																																																																																																		



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Health & Envitech Co., Ltd.

6 ซอยบางขวาง 5 ตำบลบางขวาง อำเภอเมืองนนทบุรี จังหวัดนนทบุรี 11000
6 Ngamwongwan Soi 5, Tambon Bangkhen, Muangnonthaburi, Nonthaburi 11000
Tel: (02) 9530305-9 Fax: (02) 9530310, 9588355 www.health-envitech.com Email: service@health-envitech.com



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Analyzer Performance Test

Calibrated Date : 02 September 2023

Instruments Information

Analyzer Type : NO-NO2-NOx Analyzer		Manufacturer : API	
Model : 200A		Serial Number : 1176	
Calibrator Unit			
Dilutor Model : Dasibi Model 5008		Nitric Oxide (NO) 55.54 PPM	
Serial Number : 705		Sulphur Dioxide (SO2) 55.01 PPM	
AIR Generator : API MODEL 701		Carbon Monoxide (CO) 4.533 PPM	
Serial Number : 1924		Cylinder number E80129030	
		Expire Date: 29 Oct. 2027	

Environment : Temperature 25.5 °C Humidity 51 %RH

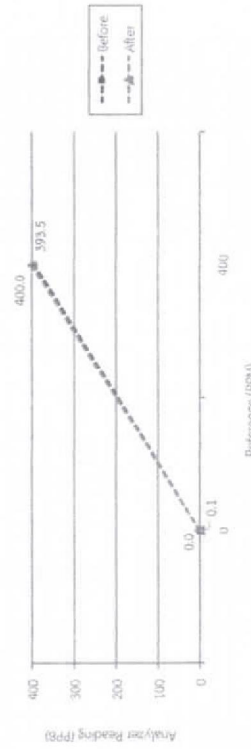
Calibration Report (Before Adjust)

Status	Zero		Span	
	Reference (PPB)	Reading (PPB)	Reference (PPB)	Drift% (PPB)
NO	0.0	0.1	400.0	393.5
NOx	0.0	0.0	400.0	394.7

Calibration Report (After Adjust)

Status	Zero		Span	
	Reference (PPB)	Reading (PPB)	Reference (PPB)	Drift% (PPB)
NO	0.0	0.1	400.0	400.0
NOx	0.0	0.0	400.0	400.0

Single Point Calibration Chart



Calibrate By :

Mr. Pasakorn Hmonthong

Approved by :

Mr. Rung Rittayan

Analyzer Performance Test

Calibrated Date : 02 September 2023

Instruments Information

Analyzer Type : NO-NO2-NOx Analyzer		Manufacturer : API	
Model : 200A		Serial Number : 1524	
Calibrator Unit		Standard Gas Concentration	
Dilutor Model : Dasibi Model 5008		Nitric Oxide (NO) 55.54 PPM	
Serial Number : 705		Sulphur Dioxide (SO2) 55.01 PPM	
ZERO AIR Generator : API MODEL 701		Carbon Monoxide (CO) 4.533 PPM	
Serial Number : 1924		Cylinder number E80129030	
		Expire Date: 29 Oct. 2027	

Environment : Temperature 25.5 °C Humidity 51 %RH

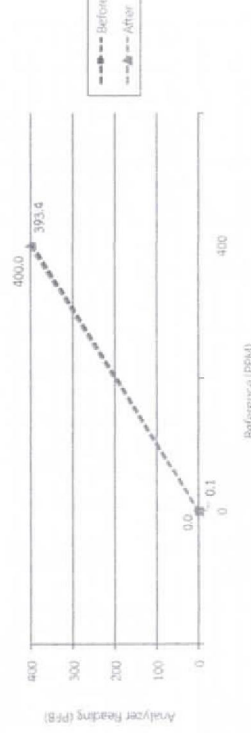
Calibration Report (Before Adjust)

Status	Zero		Span	
	Reference (PPB)	Reading (PPB)	Reference (PPB)	Drift% (PPB)
NO	0.0	0.1	400.0	393.4
NOx	0.0	0.0	400.0	394.6

Calibration Report (After Adjust)

Status	Zero		Span	
	Reference (PPB)	Reading (PPB)	Reference (PPB)	Drift% (PPB)
NO	0.0	0.1	400.0	400.0
NOx	0.0	0.0	400.0	400.0

Single Point Calibration Chart



Calibrate By :

Mr. Pasakorn Hmonthong

Approved by :

Mr. Rung Rittayan



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Health & Envitech Co., Ltd.

6 ซอยบางสวน 5 ตำบลบางสน อำเภอเมืองนนทบุรี จังหวัดนนทบุรี 11000
6 Ngamwongwan Soi 5, Tambon Bangshan, Muangnonthaburi, Nonthaburi 11000
Tel (02) 625056-9 Fax : (02) 9230310, 5865355 www.health-envitech.com Email : service@health-envitech.com



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6 Ngamwongwan Soi 5, Tambon Bangshan, Muangnonthaburi, Nonthaburi 11000
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Analyzer Performance Test

Calibrated Date : 02 September 2023

Instruments Information

Analyzer Type :	NO-NO2-NOx Analyzer	Manufacturer :	API
Model :	200A	Serial Number :	2354
Calibrator Unit		Standard Gas Concentration	
Dilutor Model :	Dasibi Model 5008	Nitric Oxide (NO)	55.54 PPM
Serial Number :	705	Sulphur Dioxide (SO2)	55.01 PPM
ZERO AIR Generator :	API MODEL 701	Carbon Monoxide (CO)	4,533 PPM
Serial Number :	1924	Cylinder number	EB0129030
		Expire Date:	29 Oct. 2027

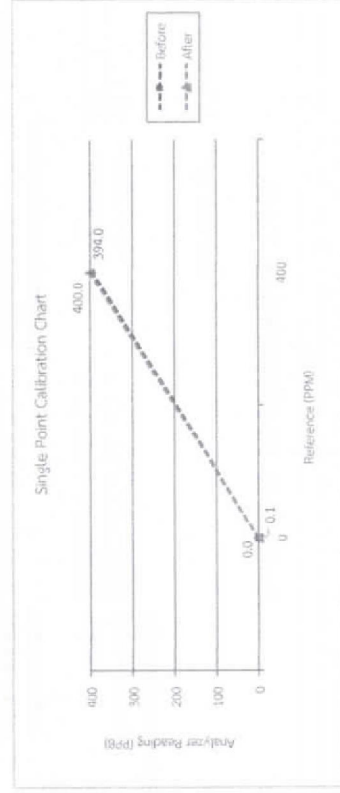
Environment : Temperature 25.5 °C Humidity 51 %RH

Calibration Report (Before Adjust)

Status	Reference (PPB)	Drift (PPB)	Reading (PPB)	Span	Reference (PPB)	Drift%
NO	0.0	0.1	0.1	394.0	400.0	-1.5
NOx	0.0	0.0	0.0	394.8	400.0	-1.3

Calibration Report (After Adjust)

Status	Reference (PPB)	Drift (PPB)	Reading (PPB)	Span	Reference (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	400.0	0.0
NOx	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By :

Mr. Pasakorn Hmonthong

Approved by :

Mr. Rung Rittayan

Analyzer Performance Test

Calibrated Date : 01 September 2023

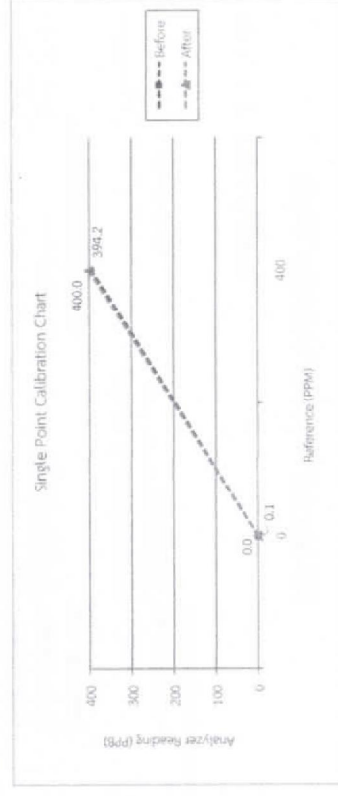
Instruments Information

Analyzer Type :	SO2 Analyzer	Manufacturer :	API
Model :	100A	Serial Number :	1157
Calibrator Unit		Standard Gas Concentration	
Dilutor Model :	Dasibi Model 5008	Nitric Oxide (NO)	55.54 PPM
Serial Number :	705	Sulphur Dioxide (SO2)	55.01 PPM
ZERO AIR Generator :	API MODEL 701	Carbon Monoxide (CO)	4,533 PPM
Serial Number :	1924	Cylinder number	EB0129030
		Expire Date:	29 Oct. 2027

Environment : Temperature 25.5 °C Humidity 51 %RH

Calibration Report

Status	Reference (PPB)	Drift (PPB)	Reading (PPB)	Span	Reference (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	394.2	-1.5
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By :

Mr. Pasakorn Hmonthong

Approved by :

Mr. Rung Rittayan



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Health & Envitech Co., Ltd.

6 ซอยงามวงศ์วาน 5 ตำบลบางเขน กรุงเทพมหานคร 11000
8 Ngamwongwan Soi 5, Tambon Banghean, Muangnontaburi, Nonthaburi 11000
Tel (02) 9526305-9 Fax : (02) 9526310, 9589355 www.healthenv.com Email : service@healthenv.com



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Health & Envitech Co., Ltd.

6 ซอยงามวงศ์วาน 5 ตำบลบางเขน กรุงเทพมหานคร 11000
8 Ngamwongwan Soi 5, Tambon Banghean, Muangnontaburi, Nonthaburi 11000
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Analyzer Performance Test

Calibrated Date : 01 September 2023

Instruments Information

Analyzer Type : SO2 Analyzer
Model : 100AS
Manufacturer : API
Serial Number : 2008

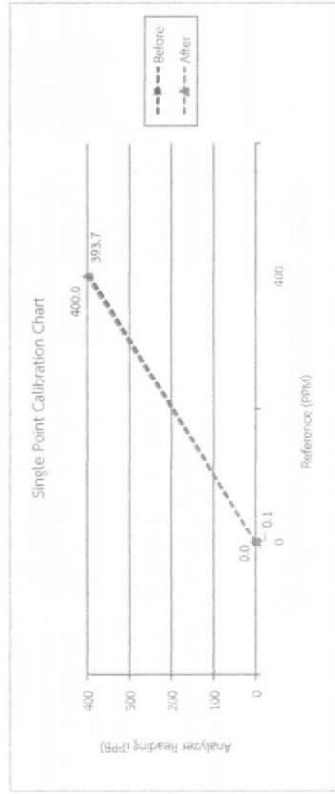
Calibrator Unit

Dilutor Model : Dasibi Model 5008
Serial Number : 705
Serial Gas Concentration
Nitric Oxide (NO) 55.54 PPM
Sulphur Dioxide (SO2) 55.01 PPM
Carbon Monoxide (CO) 4.533 PPM
ZERO AIR Generator : API MODEL 701
Serial Number : 1924
Cylinder number : EB0129030
Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity 51 %RH

Calibration Report

Status	Reference (PPB)	Zero Reading (PPB)	Drift (PPB)	Reference (PPB)	Span Reading (PPB)	Drift% (PPB)
Before	0.0	0.1	0.1	400.0	393.7	-1.6
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By :

Mr. Pasakorn Hmonthong

Approved by :

Mr. Rung Rittayan

Analyzer Performance Test

Calibrated Date : 01 September 2023

Instruments Information

Analyzer Type : SO2 Analyzer
Model : 100A
Manufacturer : API
Serial Number : 319

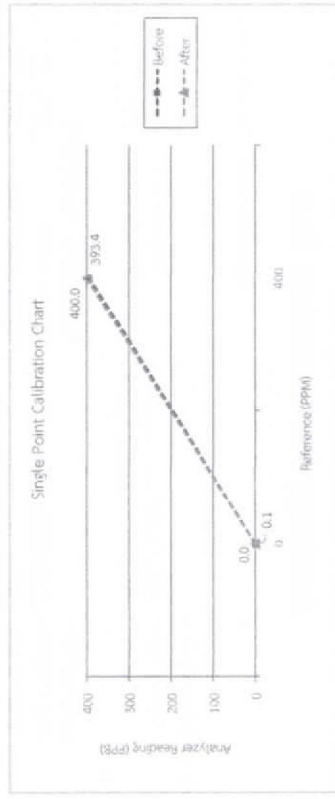
Calibrator Unit

Dilutor Model : Dasibi Model 5008
Serial Number : 705
Serial Gas Concentration
Nitric Oxide (NO) 55.54 PPM
Sulphur Dioxide (SO2) 55.01 PPM
Carbon Monoxide (CO) 4.533 PPM
ZERO AIR Generator : API MODEL 701
Serial Number : 1924
Cylinder number : EB0129030
Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity 51 %RH

Calibration Report

Status	Reference (PPB)	Zero Reading (PPB)	Drift (PPB)	Reference (PPB)	Span Reading (PPB)	Drift% (PPB)
Before	0.0	0.1	0.1	400.0	393.4	-1.7
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By :

Mr. Pasakorn Hmonthong

Approved by :

Mr. Rung Rittayan



บริษัท เอ็นวีอาร์ เซอร์วิส จำกัด

42 รามอินทรา 14 เขต 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพมหานคร 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
บริษัท เอ็นวีอาร์ เซอร์วิส จำกัด
ENVIRO SERVICE CO., LTD. 42 Ramindra 14 York 9, Tha Rang, Bangkok, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201



บริษัท เอ็นวีอาร์ เซอร์วิส จำกัด

42 รามอินทรา 14 เขต 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพมหานคร 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
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ENVIRO SERVICE CO., LTD. 42 Ramindra 14 York 9, Tha Rang, Bangkok, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Calibration Certificate

Date of Issue 24 October 2023 Page : 1 of 2

Object Wind speed and wind direction
Manufacture NRG Instruments
Type Sensor : NRG 4DC, 200P
Serial No Basic Datalogger : 309017846
Customer Health & Envitech CO.,Ltd.
6 Ngamwongwan Soi 5, Tumbon Bangkhen, Muangnontaburi, Nontaburi 11000

Calibration Condition : Temperature 25.2 °C Barometric Pressure 1012.8 hPa
NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642 S/N 91563
: Wind Aloft Plotting Board
N.I.S.T. Test Reference Number 731/241460
: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)
JAPAN QUALITY ASSURANCE ORGANIZATION
: Theodor Friedrich : Dry No. 8390/94 Wet No.
8389/94
: Thermosneider No. 918802
STANDARD THERMOMETER : Digital Barometer Vaisala Type RTB220 No. V1220015
STANDARD BAROMETER

Calibrated by :

Mr. Pasagorn Samol

Calibrated by :

Mr. Pasagorn Samol

The Result of Calibration

Date of Issue 24 October 2023 Page : 2 of 2

Standard	HOOK GAGE NO 1425			TESTED ANEMOMETER			
	Pressure Inches	Vacuum Inches	Pressure hPa	Pressure hPa	Correction hPa	Velocity m/sec	Correction m/sec
Ultrasonic Anemometer m/sec							
1.00	-	-	-	-	-	0.9	0.10
3.02	-	-	-	-	-	2.8	0.22
5.04	-	-	-	-	-	4.8	0.24
7.03	-	-	-	-	-	6.9	0.13
9.01	-	-	-	-	-	8.7	0.31
11.03	-	-	-	-	-	10.7	0.33
13.01	-	-	-	-	-	12.6	0.41
15.03	-	-	-	-	-	14.1	0.93
17.05	-	-	-	-	-	16.4	0.65
20.02	-	-	-	-	-	19.1	0.92

Wind Aloft Plotting Board.	
U.S. DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270



Certificate of Calibration

Certificate Number : SPR24010271-1
 Customer : Health and Envitech Co., Ltd
 6 Ngamwongwan Road, Soi 5, Bang Khen, Mueang Nonthaburi,
 Nonthaburi 11000

Page : 1 of 3

Equipment Name	: Sound Calibrator
Manufacturer	: Quest Technologies
Model	: QC-10
Serial Number	: QE3060101
ID. Number	: SC-001
Environmental Conditions	
Ambient Temperature	: 23 °C ± 3 °C
Relative Humidity	: 50 % ± 15 %
Location of Calibration	: In-Lab
Calibration Procedure	: In-House Method
Received Date	: 18 Jan 2024
Calibration Date	: 22 Jan 2024
Recommend Due Date	: 22 Jan 2025
Date of Issue	: 23 Jan 2024

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr. Karoon Pengsalung
 Calibration Officer
 Approved by :
 (Mr. Yodyaim Chansang)
 Authorized Signatory



Calibration Report

Certificate Number : SPR24010271-1

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Measuring Receiver	8902A	2950A02471	EF-0048-23	14 Nov 2024
AUDIO Analyzer	8903B	3011A09975	EL06303/23	14 Feb 2024

Traceability

This certification is traceable to the International System of Unit maintained at :
 NIMT - The National Institute of Metrology, Thailand.
 PCAL - Professional Calibration & Services Co.,Ltd



Result of Calibration

Certificate No. : SPR24010271-1

Page : 3 of 3

Function : Sound Level

UUC Setting (±dB)	Standard Reading (dB)	Error (dB)	Uncertainty (±dB)
114	113.94	0.06	1.5

Note:

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



CERTIFICATE OF CALIBRATION

NO. 20231215045

Name of Product:	Sound Level Meter
Model:	ST-11D
Serial Number:	820378
Specification:	Class 1
Conclusion:	Pass
Date of calibration:	2023-12-14
Due Date:	2024-12-13



Calibrated by: Jim Lin

- I. This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpasse then, and applies only to the unit identified above.
- II. This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- III. This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech Co Ltd Taiwan.

1. Preliminary inspection: OK
2. Type & serial No. of Microphone: AN66425-52493
3. Adjustments to indicated sound levels:

Type of Calibrator: B&K 4231 Sound
Pressure Level: 94.0 dB

4. Measuring up limit: 140 dBA

5. Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
10	-71.1	-14.5	-0.1	1000	0.0	0.0	-0.1
20	-50.3	-6.2	-0.3	2000	0.0	0.0	-0.1
315	-39.4	-3.0	-0.3	4000	1.3	-0.2	-0.1
63	-26.2	-0.9	-0.1	8000	1.1	-0.7	-0.1
125	-16.2	-0.2	-0.1	12500	-5.9	-7.8	0.0
250	-8.6	0.0	-0.1	16000	-11.6	-13.7	0.1
500	-3.2	0.0	-0.1	20000	-23.8	-25.8	-0.6

6. Self-generated noise

Microphone replaced by electrical input signal device

9.1 dB(A)	10.7 dB(C)	15.0 dB(Z)
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7. FRS Weighting

Rate of the F weighting decrease (dB/s)	35.2
Rate of the S weighting decrease (dB/s)	4.4
Deviation of FRS	0.0

8. Level Linearity (A-weighting at frequency 1kHz)

Reference sound level 90.0 dB

Max error at 10dB steps upper reference sound level 0.1 dB

Max error at 1dB steps within 5dB of the upper limit linear operating range 0.0 dB

Max error at 10dB steps below reference sound level 0.1 dB

Max error at 1dB steps within 5dB upper the lower limit linear operating range 0.1 dB

9. Tone burst response (A Weighting) :

Single Toneburst duration /ms	Toneburst response /dB			
	LAFmax-LA	LASmax-LA	LAE-LA	LAeq-LA
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-7.4	-6.9	-7.0
2	-18.1	-26.9	-26.9	-7.0
0.25	-27.2	/	-36.0	-7.0

10. Peak C sound level (500Hz) :

Cycle	One cycle	nominal value	Positive half	nominal value	Negative half	nominal value
LQpeak-LQ(dB)	3.5	3.5	2.3	2.4	2.3	2.4

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level 112.8 dB

Sweep amplitude 40 dB

Scan cycle time: 40 S; Measurement period: 180 S.

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
L _{avg,T}	103.2	103.2	0.0
L _S	110.8	110.8	0.0
L ₁₀	108.8	108.8	0.0
L ₅₀	92.9	92.8	0.1
L ₉₀	76.9	76.8	0.1
L ₉₅	75.0	74.9	0.1

Uncertainty of measurement results: 0.4 dB (k=2)

Environment conditions:

Air temperature: 20 °C

Relative humidity: 50 %

Static pressure: 101.8 kPa

Reference equipment used in the calibration:

Description	Model	Serial No.	Expiry Date	Traceable To
Microphone	B&K 4191	2929405	2024-12-15	NML
Mini function sound calibrator	B&K 4226	2288444	2024-10-15	CGISMEC
Signal generator	DS 340	33873	2024-10-15	CEPREI

Test specifications:

- All Scalet's Sound level Meter has been calibrated in accordance with the requirements as specified in ISO 17025 and the lab calibration procedure SVI/P004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of +20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responses of the Sound Level Meter.

References:

IEC 61672-3 Sound Level Meters Part 3: Periodic tests



SCARLET | TECH

CERTIFICATE OF CALIBRATION

NO. 20231215044



3519

Name of Product:	Sound Level Meter
Model:	ST-11D
Serial Number:	820377
Specification:	Class 1
Conclusion:	Pass
Date of calibration:	2023-12-14
Due Date:	2024-12-13



Calibrated by: *Jim Lin*

- I. This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass then, and applies only to the unit identified above.
- II. This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- III. This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech Co Ltd Taiwan.

1. Preliminary inspection: OK
2. Type & serial No. of Microphone: ANWA425-50891
3. Adjustments to indicated sound levels:
Type of Calibrator: B&K 4231 Sound
Pressure Level: 94.0 dB

4. Measuring up limit: 140 dBA

5. Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
10	-71.1	-14.6	-0.1	1000	0.0	0.0	-0.1
20	-50.3	-6.1	-0.2	2000	0.1	-0.0	0.0
31.5	-39.3	-2.9	0.0	4000	1.4	-0.1	0.0
63	-26.1	-0.8	0.0	8000	1.2	-0.7	0.0
125	-16.1	-0.1	0.0	12500	-5.8	-7.8	0.0
250	-8.6	0.1	0.0	16000	-11.3	-13.6	0.0
500	-3.1	0.1	0.0	20000	-23.5	-25.8	-0.6

8. Self-generated noise

Microphone replaced by electrical input signal device

7.3 dB(A)	7.8 dB(C)	14.8 dB(Z)
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7. FES Weighting

Rate of the F weighting decrease (dB/s)	35.2
Rate of the S weighting decrease (dB/s)	4.4
Deviation of FES	-0.1

8. Level Linearity (A-weighting at frequency 1 kHz)

Reference sound level 90.0 dB

Max error at 10dB steps upper reference sound level 0.1 dB

Max error at 1dB steps within 5dB of the upper limit linear operating range 0.0 dB

Max error at 10dB steps below reference sound level 0.1 dB

Max error at 1dB steps within 5dB upper the lower limit linear operating range 0.1 dB

9. Tone burst response (A Weighting)

Single Toneburst duration /ms	Toneburst response /dB			
	LAFmax-LA	LASmax-LA	LAE-LA	LAEqT-LA
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-7.4	-6.9	-7.0
2	-18.1	-26.9	-26.9	-7.0
0.25	-27.2	/	-36.0	-7.0

10. Peak C sound level (500Hz)

Cycle	One cycle	nominal value	Positive half	Negative half	nominal value
LQpeak-LQ(dB)	3.5	3.5	2.3	2.4	2.4

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 112.8 dB

Sweep amplitude: 40 dB

Scan cycle time: 60 S, Measurement period: 180 S

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
L _{avg,T}	103.2	103.2	0.0
L ₅	110.8	110.8	0.0
L ₁₀	108.8	108.8	0.0
L ₅₀	92.9	92.8	0.1
L ₉₀	76.9	76.8	0.1
L ₉₅	75.0	74.9	0.1

Uncertainty of measurement results: 0.4 dB (k=2)

Environment conditions:

Air temperature: 20 °C
Relative humidity: 50 %
Static pressure: 101.8 kPa

Reference equipment used in the calibration:

Description	Model	Serial No.	Expiry Date	Traceable To
Microphone	BSK 4191	2929405	2024-12-15	N-M-L
Multi function sound calibrator	BSK 4226	2268444	2024-10-15	GTBISMEC
Signal generator	DS 360	33873	2024-10-15	CEPREI

Test specifications:

- All Scarlett's Sound Level Meter has been calibrated in accordance with the requirements as specified in ISO 17025 and the lab calibration procedure SMIPO04-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an BSK 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responses of the Sound Level Meter.

References:

IEC 4672-3 Sound Level Meters Part 3: Periodic tests



CERTIFICATE OF CALIBRATION

NO. 20231215046

Name of Product:	Sound Level Meter
Model:	ST-11D
Serial Number:	8203779
Specification:	Class 1
Conclusion:	Pass
Date of calibration:	2023-12-14
Due Date:	2024-12-13



Calibrated by:

- This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them, and applies only to the unit identified above.
- This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlett Tech Co Ltd Taiwan.

- Preliminary inspection: OK
- Type & serial No. of Microphone: AWA4402-S1026
- Adjustments to indicated sound levels:

4. Measuring up limit: 140 dBA

5. Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

Type of Calibrator BSK 4231 Sound Pressure Level 94.0 dB

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
10	-71.1	-14.5	-0.1	1000	0.0	0.0	-0.1
20	-50.3	-6.1	-0.3	2000	0.1	0.0	0.0
315	-39.4	-2.9	0.0	4000	1.3	-0.1	0.0
63	-26.1	-0.8	-0.1	8000	1.2	-0.7	0.0
125	-16.1	-0.2	0.0	12500	-5.8	-7.8	0.0
250	-8.6	0.0	0.0	16000	-11.3	-13.7	0.1
500	-3.2	0.1	0.0	20000	-23.2	-25.8	-0.6

6. Self-generated noise

Microphone replaced by electrical input signal device

91 dB(A)	10.4 dB(C)	15.7 dB(Z)
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7. FRS Weighting

Rate of the F weighting decrease (dB/s)	35.2
Rate of the S weighting decrease (dB/s)	4.4
Deviation of FRS	-0.1

8. Level Uncertainty (A-weighting at frequency 1 kHz)

Reference sound level 90.0 dB

Max error at 10dB steps upper reference sound level 0.1 dB

Max error at 1dB steps within 5dB of the upper limit linear operating range 0.0 dB

Max error at 10dB steps below reference sound level 0.1 dB

Max error at 1dB steps within 5dB upper the lower limit linear operating range 0.1 dB

9. Tone burst response (A Weighting)

Single Toneburst duration /ms	Toneburst response /dB			
	LAFmax-LA	LASmax-LA	LAE-LA	LAsqT-LA
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-7.4	-6.9	-7.0
2	-18.1	-26.9	-26.9	-7.0
0.25	-27.2	/	-36.0	-7.0

10. Peak C sound level (500Hz)

Cycle	One cycle	nominal value	Positive half	nominal value	Negative half	nominal value
LPeak-LC(dB)	3.5	3.5	2.3	2.4	2.3	2.4

11. Overload indication

Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level:112.8 dB

Sweep amplitude:40 dB

Scan cycle time: 60 S; Measurement period: 180 S.

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
L _{Aeq,T}	103.2	103.2	0.0
L _S	110.8	110.8	0.0
L ₁₀	108.8	108.8	0.0
L ₅₀	92.9	92.8	0.1
L ₉₀	76.9	76.8	0.1
L ₉₅	75.0	74.9	0.1

Uncertainty of measurement results: 0.4 dB (k=2)

Environment conditions:

Air temperature: 20 °C

Relative humidity: 50 %

Static pressure: 101.8 kPa

Reference equipment used in the calibration:

Description	Model	Serial No.	Expiry Date	Traceable To
Microphone	B&K 4191	2979405	2024-12-15	NML
Multi function sound calibrator	B&K 4226	2288444	2024-10-15	CIGIS-NEC
Signal generator	DS 360	33873	2024-10-15	CEPREI

Test specifications:

- All Scalet's Sound level Meter has been calibrated in accordance with the requirements as specified in ISO 17025 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responses of the Sound Level Meter.

References:

IEC 61672-3 Sound Level Meters Part 3: Periodic tests



SCARLET TECH



CERTIFICATE OF CALIBRATION

NO. 20231215041

Name of Product:	Sound Level Meter
Model:	ST-11D
Serial Number:	820372
Specification:	Class 1
Conclusion:	Pass
Date of calibration:	2023-12-14
Due Date:	2024-12-13



Calibrated by:

Jim Lin

- This report certifies that all calibration equipment used in the test is traceable with the Internal (ISO9001) procedures and meets all specification given in the Manual(s) or respectively surpass; then, and applies only to the unit identified above.
- This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech Co Ltd Taiwan.

- Preliminary inspection: OK
- Type & serial No. of Microphone: ANNA425-52842
- Adjustments to indicated sound levels:
Type of Calibrator B&K 4231 Sound
Pressure Level 94.0 dB
- Measuring up limit: 140 dBA
- Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency / Hz	Frequency weighting / dB			Nominal frequency / Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
10	-71.1	-14.6	-0.2	1000	0.0	0.0	-0.1
20	-50.3	-6.1	-0.4	2000	0.1	-0.0	0.0
31.5	-39.5	-3.0	-0.2	4000	1.3	-0.1	0.0
63	-26.2	-0.8	-0.1	8000	1.2	-0.7	0.0
125	-16.2	-0.2	0.0	12500	-5.6	-7.8	0.0
250	-8.6	0.0	0.0	16000	-11.7	-13.7	0.1
500	-3.2	0.0	0.0	20000	-23.8	-25.9	-0.6

6. Self-generated noise

Microphone replaced by electrical input signal device

9.6 dB(A)	10.4 dB(C)	14.5 dB(Z)
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7. FGS Weighting

Rate of the F weighting decrease (dB/s)	35.2
Rate of the S weighting decrease (dB/s)	4.2
Deviation of FGS	0.0

8. Level Linearity (A-weighting at frequency 1 kHz)

Reference sound level 90.0 dB
Max error at 10dB steps upper reference sound level 0.1 dB
Max error at 1dB steps within 5dB of the upper limit linear operating range 0.0 dB
Max error at 10dB steps below reference sound level 0.1 dB
Max error at 1dB steps within 5dB upper the lower limit linear operating range 0.1 dB

9. Tone burst response (A Weighting)

Single Toneburst duration /ms	Toneburst response /dB			
	LAFmax-LA	LASmax-LA	LAE-LA	LAeqT-LA
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-7.4	-6.9	-7.0
2	-18.1	-26.9	-26.9	-7.0
0.25	-27.2	/	-36.0	-7.0

10. Peak C sound level (500Hz)

Cycle	One cycle	nominal value	Positive half	Negative half	nominal value
LDpeak-LC(dB)	3.5	3.5	2.3	2.3	2.4

11. Overload indication

Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 112.8 dB
Sweep amplitude: 40 dB
Scan cycle time: 60 S; Measurement period: 180 S

Nomenclature

P_b - Barometric Pressure
 DGM - Dry Gas Meter
 K_1 - Constant based on standard temp and press
 t - Run time, in minutes
 P_m - ΔH (Meter Pressure, gauge)
 V_m - Volume collected by test meter, corrected for STP
 $Q_{m(std)}$ - Calculated flow rate of test meter
 K - Critical orifice coefficient
 P_{ref} - Measured pressure of reference meter
 t_m - Temperature measured in reference meter

Equations

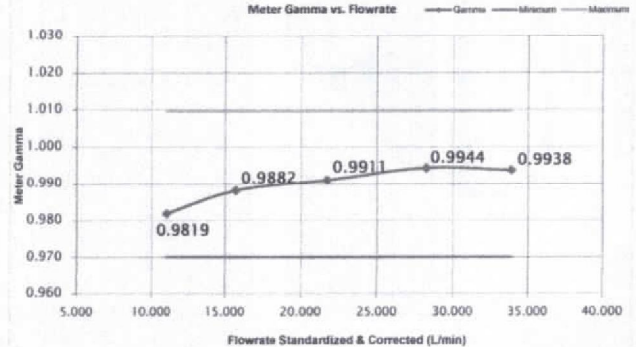
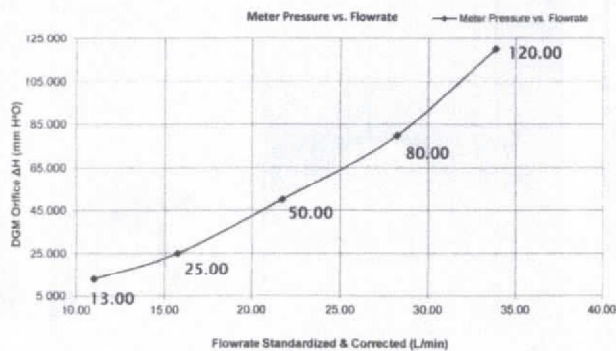
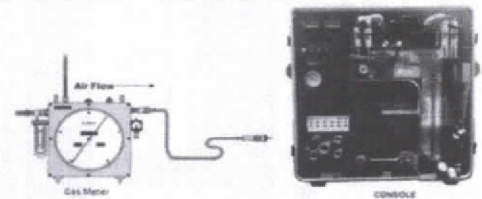
$$V_{m(std)} = Y * K_1 \frac{V_m * (P_{bar} + \frac{P_{m(std)}}{13.6})}{T_m}$$

$$V_{m(std)} = \frac{K_1 V_m (P_{bar} + \frac{\Delta H}{13.6})}{T_m}$$

$$K_1 = \frac{T_{std}}{P_{std}} \quad Y = \frac{V_{ref(std)}}{V_{m(std)}} \quad Q_{m(std)} = \frac{V_{m(std)}}{t}$$

$$\Delta H_{ref} = \frac{P_{m(std)} * 0.0011606 * (P_{bar} + \frac{P_{m(std)}}{13.6})}{T_m} * (T_m + 49)^2$$

Calibration Train



UUT Meter Console Information

Model #: XC-572-OV
 Serial #: 1204012
 DGM Model #: G1.6
 DGM Serial #: 2012-006454

Calibration Conditions

Bar. Pressure (mm Hg): 756.8
 Ambient Temperature (°C): 24.7
 Relative Humidity (%): 51.0
 Altitude (m): 1.83
 Bar. Pressure Corr. (mm Hg): 756.7

Factors/Conversions

Std. Temp. (K): 293.15
 Std. Press. (mm Hg): 760
 K_1 (K/mm Hg): 0.3857

Reference Equipment

Calibration Meter Model: DGMR-200H
 Cal. Due Date: 25-Jul-24
 Serial No.: 0000026
 Gamma: 1.0000

UUT Meter (DGM)

Run Time (minutes)	Orifice, ΔH (mm H2O)	Volume			Meter Temperature (°C)		Meter Pressure (mm H2O)	Volume (L)			Outlet Temperature (°C)	
		Initial (L)	Final (L)	Total (L)	Initial	Final		Initial	Final	Total	Initial	0.00
0	$P_{m(g)}$	V_m	V_{ref}	V_m	t_{m1}	t_{m2}	P_m	V_m	V_{ref}	V_m	t_{m1}	t_{m2}
840.00	13.00	338514.6	338674.4	159.8	24.0	24.0	0.3	0.00	156.99	156.99	24.0	24.0
600.00	25.00	338674.4	338836.0	161.6	24.0	24.0	0.5	0.00	159.88	159.88	24.0	24.0
455.00	50.00	338836.0	339005.2	169.2	25.0	26.0	0.6	0.00	167.42	167.42	24.0	24.0
350.00	80.00	339005.2	339173.8	168.6	26.0	27.0	2.0	0.00	166.72	166.72	24.0	24.0
300.00	120.00	339173.8	339347.0	173.2	27.0	27.0	2.4	0.00	171.38	171.38	24.0	24.0

Reference Meter (WTM)

Standardized Data

Reference Meter (L)		UUT Meter (L)		Correction Factor		ΔH @ (mm H2O)	
Std. Vol.	Std. Flow	Std. Vol.	Std. Flow	Value	Variance	ΔH @	Variance
$V_{m(std)}$	$Q_{m(std)}$	$V_{m(std)}$	$V_{ref(std)}$	Y	ΔY	ΔH @	$\Delta \Delta H$ @
154.31	11.02	157.15	11.0	0.9819	-0.0080	47.5	1.219
157.23	15.72	159.11	15.7	0.9882	-0.0017	45.0	1.296
164.68	21.72	166.16	21.7	0.9911	0.0012	47.1	0.786
164.57	28.21	165.49	28.2	0.9944	0.0045	45.0	-1.372
169.33	33.87	170.38	33.9	0.9938	0.0039	47.0	0.863
				0.9899	= Y Avg.	46.3	= ΔH @ Avg. Metric

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ± 0.02 .
 Note: For ΔH , orifice pressure differential that equates to 0.0212mm H2O at standard temperature and pressure, acceptable tolerance of individual values from the average is ± 0.2 inches (5.1mm) H2O

Pass/Fail Judgment :

Pass

Calibrate By: D. P.

Approved By: [Signature]

Date: 29 Aug 23

The instruments listed and described on this certificate have been calibrated against standards traceable to the National Institute of Standards and Technology (NIST) and in reference to EPA Method 5, Section 10.3.1

Console Information

Model #:	XC-572-OV
Serial #:	1204012
Units:	Metric

Calibration Conditions

Bar (mm. Hg):	756.8
Humidity (%):	51
Temp (°C):	24.7

Reference Devices

Calibrator Model:	CC-VTR-SH
Reference #:	091109269
Comer Model:	736930

Serial #:	1204012
Units:	Metric

Type: "English"

Console Information

Pbar (mm. Hg):	756.8
Humidity (%):	51.0
Tamb (°C):	24.7
Corr. Pbar (mm. Hg):	756.7

Calibration Conditions

Pbar (mm. Hg):	756.8
Humidity (%):	51.0
Tamb (°C):	24.7
Corr. Pbar (mm. Hg):	756.7

Reference Devices

TC Simulator Model:	CC-VTR-SH
Reference #	091109269
Barometer Model:	736930
Reference #	EBARODIALSPE01
Pure Calibrator Model:	718300
Reference #	389100

Pressure Gauge / Manometer Calibration Data

Temperature Display Calibration Data									
Reference Point ¹		Reference Temp. °C	Test Thermocouple Calibrations						Reference Point Status ² Pass/Fail
			Aux °C	Stack °C	Probe °C	Oven °C	Filter °C	Exit °C	
1	-18	-17	-16	-17	-17	-17	-17	-18	PASS
2	38	37	37	36	36	36	37	PASS	
3	59	92	93	92	92	92	92	PASS	
4	149	145	149	145	145	145	145	PASS	
5	260	259	258	258	258	259	259	PASS	
6	371	370	371	370	370	370	370	PASS	
7	482	481	481	480	480	480	481	PASS	
8	593	592	593	591	591	592	592	PASS	
9	816	815	815	814	814	814	815	PASS	
10	1038	1038	1037	1037	1037	1037	1038	PASS	
Overall Audit Status									PASS

NIST Reference Thermocouple ID:

Ref Point	Theoretical Temp	DGM Thermocouple Sensor Reading	ΔT_{ave} °C
1	0.9	1	0.04%
2	24.7	24	0.14%

Internal temperature (microclimate) is not sufficient to EPA standards, and should not be used as an official reference for ambient temperature.

Calibrate By:

Approved By:

Date:

29 Aug 23

Notes

Suggested minimum reference points are 0 (0, 100, 200, 300, 500, 750, 900, 1100, 1300, 1500, 1700, 1900, 2100, 2300, 2500, 2700, 2900, 3100, 3300, 3500, 3700, 3900, 4100, 4300, 4500, 4700, 4900, 5100, 5300, 5500, 5700, 5900, 6100, 6300, 6500, 6700, 6900, 7100, 7300, 7500, 7700, 7900, 8100, 8300, 8500, 8700, 8900, 9100, 9300, 9500, 9700, 9900, 10100, 10300, 10500, 10700, 10900, 11100, 11300, 11500, 11700, 11900, 12100, 12300, 12500, 12700, 12900, 13100, 13300, 13500, 13700, 13900, 14100, 14300, 14500, 14700, 14900, 15100, 15300, 15500, 15700, 15900, 16100, 16300, 16500, 16700, 16900, 17100, 17300, 17500, 17700, 17900, 18100, 18300, 18500, 18700, 18900, 19100, 19300, 19500, 19700, 19900, 20100, 20300, 20500, 20700, 20900, 21100, 21300, 21500, 21700, 21900, 22100, 22300, 22500, 22700, 22900, 23100, 23300, 23500, 23700, 23900, 24100, 24300, 24500, 24700, 24900, 25100, 25300, 25500, 25700, 25900, 26100, 26300, 26500, 26700, 26900, 27100, 27300, 27500, 27700, 27900, 28100, 28300, 28500, 28700, 28900, 29100, 29300, 29500, 29700, 29900, 30100, 30300, 30500, 30700, 30900, 31100, 31300, 31500, 31700, 31900, 32100, 32300, 32500, 32700, 32900, 33100, 33300, 33500, 33700, 33900, 34100, 34300, 34500, 34700, 34900, 35100, 35300, 35500, 35700, 35900, 36100, 36300, 36500, 36700, 36900, 37100, 37300, 37500, 37700, 37900, 38100, 38300, 38500, 38700, 38900, 39100, 39300, 39500, 39700, 39900, 40100, 40300, 40500, 40700, 40900, 41100, 41300, 41500, 41700, 41900, 42100, 42300, 42500, 42700, 42900, 43100, 43300, 43500, 43700, 43900, 44100, 44300, 44500, 44700, 44900, 45100, 45300, 45500, 45700, 45900, 46100, 46300, 46500, 46700, 46900, 47100, 47300, 47500, 47700, 47900, 48100, 48300, 48500, 48700, 48900, 49100, 49300, 49500, 49700, 49900, 50100, 50300, 50500, 50700, 50900, 51100, 51300, 51500, 51700, 51900, 52100, 52300, 52500, 52700, 52900, 53100, 53300, 53500, 53700, 53900, 54100, 54300, 54500, 54700, 54900, 55100, 55300, 55500, 55700, 55900, 56100, 56300, 56500, 56700, 56900, 57100, 57300, 57500, 57700, 57900, 58100, 58300, 58500, 58700, 58900, 59100, 59300, 59500, 59700, 59900, 60100, 60300, 60500, 60700, 60900, 61100, 61300, 61500, 61700, 61900, 62100, 62300, 62500, 62700, 62900, 63100, 63300, 63500, 63700, 63900, 64100, 64300, 64500, 64700, 64900, 65100, 65300, 65500, 65700, 65900, 66100, 66300, 66500, 66700, 66900, 67100, 67300, 67500, 67700, 67900, 68100, 68300, 68500, 68700, 68900, 69100, 69300, 69500, 69700, 69900, 70100, 70300, 70500, 70700, 70900, 71100, 71300, 71500, 71700, 71900, 72100, 72300, 72500, 72700, 72900, 73100, 73300, 73500, 73700, 73900, 74100, 74300, 74500, 74700, 74900, 75100, 75300, 75500, 75700, 75900, 76100, 76300, 76500, 76700, 76900, 77100, 77300, 77500, 77700, 77900, 78100, 78300, 78500, 78700, 78900, 79100, 79300, 79500, 79700, 79900, 80100, 80300, 80500, 80700, 80900, 81100, 81300, 81500, 81700, 81900, 82100, 82300, 82500, 82700, 82900, 83100, 83300, 83500, 83700, 83900, 84100, 84300, 84500, 84700, 84900, 85100, 85300, 85500, 85700, 85900, 86100, 86300, 86500, 86700, 86900, 87100, 87300, 87500, 87700, 87900, 88100, 88300, 88500, 88700, 88900, 89100, 89300, 89500, 89700, 89900, 90100, 90300, 90500, 90700, 90900, 91100, 91300, 91500, 91700, 91900, 92100, 92300, 92500, 92700, 92900, 93100, 93300, 93500, 93700, 93900, 94100, 94300, 94500, 94700, 94900, 95100, 95300, 95500, 95700, 95900, 96100, 96300, 96500, 96700, 96900, 97100, 97300, 97500, 97700, 97900, 98100, 98300, 98500, 98700, 98900, 99100, 99300, 99500, 99700, 99900, 100100, 100300, 100500, 100700, 100900, 101100, 101300, 101500, 101700, 101900, 102100, 102300, 102500, 102700, 102900, 103100, 103300, 103500, 103700, 103900, 104100, 104300, 104500, 104700, 104900, 105100, 105300, 105500, 105700, 105900, 106100, 106300, 106500, 106700, 106900, 107100, 107300, 107500, 107700, 107900, 108100, 108300, 108500, 108700, 108900, 109100, 109300, 109500, 109700, 109900, 110100, 110300, 110500, 110700, 110900, 111100, 111300, 111500, 111700, 111900, 112100, 112300, 112500, 112700, 112900, 113100, 113300, 113500, 113700, 113900, 114100, 114300, 114500, 114700, 114900, 115100, 115300, 115500, 115700, 1

Do not change this cell value. It is linked based on input from Cell H6 at the top of this sheet under "Cultivation Conditions".

in temperature difference and other formulas are calculated based on unit load from cell C8 at the top of this sheet under "Notes: Concrete Information"

the numerous differences between these and values for the same tissues in the literature should be taken into account. The values for the same tissues in the literature are: liver (1.0-1.5), kidney (1.0-1.5), heart (1.0-1.5), muscle (1.0-1.5), bone (1.0-1.5), and fat (1.0-1.5).

E_{ox} values results, the maximum difference between constants and reference vacuum readings should be less than ± 0.05 in ± 0.05 mm HgO) or 5% of full scale.

Calibrate By: P. Thompson Approved By: _____

Date:

29 Aug 23

need

Needless Supply Instrument Co., Ltd

Suggested minimum reference points are 100-190-260-370 mm.

100 1800 1900 " can help for more

For valid test results, the maximum difference between the maximum and minimum reference points is 0.5°C (0.9°F). For all thermocouples except for the pack thermocouple which should be less than 1.5°C (2.7°F) absolute temperature from the reference reading, and the old thermocouple which should be less than 1.5°C (2.7°F) absolute temperature from the reference reading, the old thermocouple should be replaced.

Do not change this cell value. It is instead based on input from Cell H8 at the top of this sheet under "Calibration Conditions".

^a Accusys temperature difference and other formulas are calculated based on unit input from all CIs at the top of this sheet under "Matrix Console information".

For valid test results, the maximum difference between console and reference vacuum readings should be less than ± 0.5 in. Hg (± 12.5 mm Hg).

²For valid test results, the maximum difference between sensor and reference vacuum readings should be less than -0.08 in. H₂O (±1.25 mm H₂O), or 5% of full scale (verify that the above Thermocouple Sensors were calibrated in accordance with US EPA Methods 2 and 5, CFR 40 Part 10).



Nozzle Validation

Sampling System Equipment Information

Console Model	XC-572-OV
Console Number	1204012
DGM Model	G1.8
DGM Number	2012-006454

Validation Conditions

Digital Calipers	CD-15APX
Reference No	A22070181
Temperature	24.7 °C±3
Barometric Pressure	756.8 mm Hg

Nozzle ID	Validation Data				Results	
	Nozzle Diameter				Different	(D ₁ + D ₂ + D ₃) / 3
Sizes	D ₁	D ₂	D ₃	D _{avg}	ΔD	
	mm	mm	mm	mm	mm	mm
4	3.17	3.16	3.16	3.16	0.000	3.160
6	4.77	4.73	4.74	4.73	0.006	4.733
8	6.35	6.34	6.35	6.347	0.006	6.347
10	7.92	7.91	7.90	7.903	0.006	7.903
12	9.52	9.47	9.47	9.470	0.000	9.470
14	11.09	11.04	11.02	11.033	0.012	11.033
16	12.70	12.70	12.70	12.700	0.000	12.700

Where:

D₁, D₂, D₃ = Three difference nozzle diameters, mm; diameter must be within 0.025 mm

ΔD = Maximum difference between any two diameters, must be ≤ 0.100 mm

D_{avg} = (D₁ + D₂ + D₃) / 3



Validation By:

Deep P.

Approved By:

[Signature]

Date:

29 Aug 23

neediss
Neediss Supply Instrument Co., Ltd.



บริษัท เอ็นวีวี เซอร์วิส จำกัด

42 ซอยอินทรี 14 หมู่ 9 แขวงคลองตัน เขตคลองเตย กรุงเทพฯ 10120 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
สาขาบริการภาคใต้ 42 Raminthra 14 year 9, Tha Klang, Bangkok, Bangkok 10210 Tel: 02-9435814-5 Fax: 02-9438201
BRANCH SERVICE: COT, LTD.

Analyzer Performance Test

Calibrated Date: 26 June 2023

Instruments Information

Analyzer Type: SO2 Analyzer Model: 42C	Manufacturer: Thermo Environmental SIN: 43CHL-55690-324
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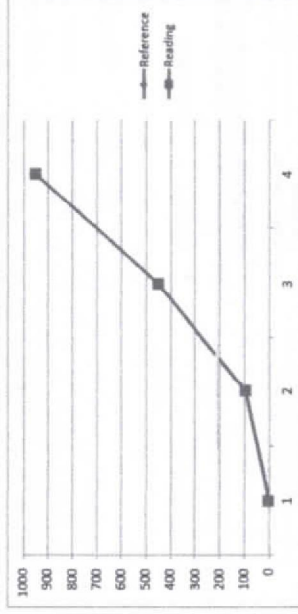
Calibration System

Dilutor Model: Dasig Model 5008 SIN: 705 ZERO AIR Generator API Model 701 SIN: 1924	Standard Gas NO Conc 957.2 PPM SO2 Conc 960.7 PPM CO Conc 960.4 PPM Expire Date: 29-Oct-27
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Environment: Temperature 25.5 °C Humidity 51 %RH

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS		
	Reference	Reading	%ERROR
ZERO	0	0	0.00
1	95	94.1	-0.90
2	450	450	0.00
3	950	950.6	0.06
			0.22



Calibrate By: *[Signature]*
MR. PASAGORN SAMOL



บริษัท เอ็นวีเอ เซอร์วิส จำกัด

42 รามอินทรา 14 ยอ 9, The Rang, Bangkok, Bangkok 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
บริษัท เอ็นวีเอ เซอร์วิส จำกัด
ENVIA SERVICE CO., LTD. 42 Ramindra 14 yolk 9, The Rang, Bangkok, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201



บริษัท เอ็นวีเอ เซอร์วิส จำกัด

42 รามอินทรา 14 ยอ 9, The Rang, Bangkok, Bangkok 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
บริษัท เอ็นวีเอ เซอร์วิส จำกัด
ENVIA SERVICE CO., LTD. 42 Ramindra 14 yolk 9, The Rang, Bangkok, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201

1. ข้อมูล Analyzer Calibration Error

Certified conc of calibration gas; C_v (ppm)	Measured concentration of calibration gas; C_{bw} (ppm)	$ C_v - C_{bw} $ (ppm)	$ACE = \frac{ C_v - C_{bw} }{C_v} \times 100$ (%)
Low 95	94.10	0.90	0.95
Mid 450	450.00	0.00	1.00
High 950	950.60	0.60	0.00

สรุปผลการทดสอบ

ความผิดพลาดของการสอบเทียบ (Analyzer (Direct) calibration error; ACE)

<input checked="" type="checkbox"/> ผ่าน	$\leq \pm 5\%$
<input type="checkbox"/> ไม่ผ่าน	$> \pm 5\%$

2. ข้อมูลการเปรียบเทียบเครื่องมือวัดก๊าซมาตรฐานที่ระดับความเข้มข้นค่า กลาง หรือความเข้มข้นสูง (Initial Analyzer Calibration) และ System Bias Error

Calibration gas level (ppm)	Initial values				Final values		
	C_{bw} (ppm)	System response time (Second)	Measured concentration of calibration gas (System); C_s (ppm)	$SB_1 = \frac{ C_{bw} - C_s }{C_s} \times 100$ (%)	C_s (ppm)	SB_1 (%)	Drift $m_1 - m_0$ (%)
Low level 95	94.10	300	95.05	1.00	95.40	1.37	0.37
High or mid level 950	950.60	300	950	0.06	950.20	0.04	0.02

1. ข้อมูล Analyzer Calibration Error

Certified conc of calibration gas; C_v (ppm)	Measured concentration of calibration gas; C_{bw} (ppm)	$ C_v - C_{bw} $ (ppm)	$ACE = \frac{ C_v - C_{bw} }{C_v} \times 100$ (%)
Low 95	95.05	0.05	0.05
Mid 450	451.00	1.00	1.00
High 950	950.50	0.50	0.00

สรุปผลการทดสอบ

ความผิดพลาดของการสอบเทียบ (Analyzer (Direct) calibration error; ACE)

<input checked="" type="checkbox"/> ผ่าน	$\leq \pm 5\%$
<input type="checkbox"/> ไม่ผ่าน	$> \pm 5\%$

2. ข้อมูลการเปรียบเทียบเครื่องมือวัดก๊าซมาตรฐานที่ระดับความเข้มข้นค่า กลาง หรือความเข้มข้นสูง (Initial Analyzer Calibration) และ System Bias Error

Calibration gas level (ppm)	Initial values				Final values		
	C_{bw} (ppm)	System response time (Second)	Measured concentration of calibration gas (System); C_s (ppm)	$SB_1 = \frac{ C_{bw} - C_s }{C_s} \times 100$ (%)	C_s (ppm)	SB_1 (%)	Drift $m_1 - m_0$ (%)
Low level 95	95.05	300	95.05	0.00	95.40	0.37	0.37
High or mid level 950	950.50	300	950	0.05	950.20	0.03	0.02



บริษัท เอ็นวีวี เซอร์วิส จำกัด

42 รามอินทรา 14 แขวง 9 เขตจตุจักร กรุงเทพมหานคร 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
E-mail: envia@envia-service.co.th envia-service.co.th
ENVIA SERVICE CO., LTD. 42 Ramithin 14 yek 9, Tha Rang, Bangkok, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201

สรุปผลการทดสอบ

ค่า bias เริ่มต้นของระบบ (Initial system bias check; SB_i)

<input checked="" type="checkbox"/>	ค่า $\leq \pm 5\%$
<input type="checkbox"/>	ไม่ผ่าน $> \pm 5\%$

ค่า bias หลังการตรวจวัด (Post run system bias check; SB_p)

<input checked="" type="checkbox"/>	ค่า $\leq \pm 5\%$
<input type="checkbox"/>	ไม่ผ่าน $> \pm 5\%$

การประเมินค่า Drift (Drift assessment)

<input checked="" type="checkbox"/>	ค่า $\leq \pm 3\%$
<input type="checkbox"/>	ไม่ผ่าน $> \pm 3\%$



บริษัท เอ็นวีวี เซอร์วิส จำกัด

42 รามอินทรา 14 แขวง 9 เขตจตุจักร กรุงเทพมหานคร 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
E-mail: envia@envia-service.co.th envia-service.co.th
ENVIA SERVICE CO., LTD. 42 Ramithin 14 yek 9, Tha Rang, Bangkok, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Analyzer Performance Test

Calibrated Date: 26 June 2023

Instruments Information

Analyzer Type: NOx Analyzer Model: 42C	Manufacturer: Thermo Environmental S/N: 42CXL-052/613257
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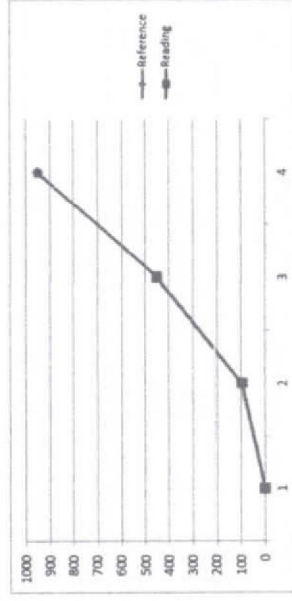
Calibration System

Calibrator Unit	Standard Gas
Dilutor Model: Dasta Model 5008 S/N: 705	NO Conc 957.2 PPM SO ₂ Conc 960.7 PPM CO Conc 960.4 PPM
ZERO AIR Generator API MODEL 701 S/N: 1924	Expire Date: 29-Oct-27

Environment: Temperature 25.5 °C Humidity 51 %RH

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	Reference	Reading	ERROR	%ERROR
ZERO	0	0	0.00	0.00
1	95	95.05	0.05	0.05
2	450	451	1.00	0.22
3	950	950.5	0.50	0.05
				0.08



Calibrate By: Mr. PASAGORN SAMOL



บริษัท เอ็นวีวี เซอร์วิส จำกัด

42 ถนนมิตรภาพ 14 กิโลเมตร 9 แขวงสามเวิ้ง เขตหนองแขม กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
ENVIA SERVICE CO., LTD. 42 Ramothra 14 yak 9, The Rang, Bangkok, Bangkok 10230 Tel: 02-9435814-5 Fax: 02-9438201



บริษัท เอ็นวีวี เซอร์วิส จำกัด

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1. ข้อมูล Analyzer Calibration Error

Certified conc of calibration gas; C_v (ppm)	Measured concentration of calibration gas; C_m (ppm)	$ C_v - C_m $ (ppm)	$ACE = \frac{ C_v - C_m }{C_v} (100)$ (%)
Low 95	95.05	0.05	0.05
Mid 450	451.00	1.00	1.00
High 950	950.50	0.50	0.00

สรุปผลการทดสอบ

ความผิดพลาดของการสอบเทียบ (Analyzer (Direct) calibration error; ACE)

<input checked="" type="checkbox"/> ผ่าน $\leq \pm 5\%$
<input type="checkbox"/> ไม่ผ่าน $> \pm 5\%$

2. ข้อมูลการเปรียบเทียบเครื่องมือวัดที่มาตรฐานเพื่อวัดความเข้มข้นค่ากลาง หรือความเข้มข้นสูง (Initial Analyzer Calibration) และ System Bias Error

Calibration gas level (ppm)	Initial values				Final values	
	C_{av} (ppm)	System response time (Second)	Measured concentration of calibration gas (System); C_s (ppm)	$SB_i = \frac{C_s - C_{av}}{C_{av}} \times 100$ (%)	C_s (ppm)	SB_f (%)
Low level 95	95.05	300	95.05	0.00	95.40	0.37
High or mid level 950	950.50	300	950	0.05	950.20	0.02

สรุปผลการทดสอบ

ค่า bias เริ่มต้นพอรับได้ (Initial system bias check; SB_i)

<input checked="" type="checkbox"/> ผ่าน $\leq \pm 5\%$
<input type="checkbox"/> ไม่ผ่าน $> \pm 5\%$

ค่า bias หลังการตรวจวัด (Post run system bias check; SB_f)

<input checked="" type="checkbox"/> ผ่าน $\leq \pm 5\%$
<input type="checkbox"/> ไม่ผ่าน $> \pm 5\%$

การประเมินค่า Drift (Drift assessment)

<input checked="" type="checkbox"/> ผ่าน $\leq \pm 3\%$
<input type="checkbox"/> ไม่ผ่าน $> \pm 3\%$



Inctech Metrological Center Co.,Ltd.
39/1 Soi 82, Sukhapiban 5 Rd., O ngoen,
Salmal, Bangkok 10220, Thailand
Tel. (662) 909-8820 (Auto 10 lines) www.imcinstrument.com



Inctech Metrological Center Co.,Ltd.
39/1 Soi 82, Sukhapiban 5 Rd., O ngoen,
Salmal, Bangkok 10220, Thailand
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Certificate of Calibration

Certificate No. : MC23-2564
Page : 1 of 2

Customer : Health & Envitech Co., Ltd.
Address : 77/11 M. 2 Ngamwongwan Rd., Soi 5, T. Bangkhen, A. Muang Nontaburi 11000

Description : Personal Sampler Calibrator
Manufacturer : SKC
Model : 303
Serial No. : N/A
Identification No. : PC-001
Calibration Place : Chemical Laboratory 2

Order No. : 3717/23
Received date : Nov 20, 2023
Calibration date : Nov 22, 2023
Environment Condition :
Temperature : (20+/- 2) °C
Humidity : (50+/- 15) %RH

Calibration Method : Calibration were conducted using In-house calibration procedure CP-MC-004 According to comparison with Analytical Balance. The calibration methods based on ASTM E542-01.

Reference Standard Instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
Analytical Balance	AE-FA220	201907106	MM23-2635	Aug 07, 2024
Humidity / Baro / Temp. Data Recorder	MHB-382SD	N/A	MT23-4860	Jul 25, 2024
Digital Thermometer	EFT-4	EFT42020033	MT23-3227	May 01, 2024

This result of calibration was found accurate as shown on date and place of calibration only.

Traceability : This measurement are traceable to the International System of Unit (SI), through
National Institute of Metrology Thailand (NIMT)

The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor $k = 2$, providing a level of confidence of not less than 95%



Calibrated by : Miss Nuengruethai Siripoch
Issue date : Nov 22, 2023

Approved by : 
(Mr. Panuwat Phukian)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of Inctech Metrological Center Co.,Ltd

Result : Without adjustment
Calibration Point : 50, 90, 100, 110 ml

Nominal value (ml)	Standard reading (ml)	UUC* correction (ml)	Uncertainty of measurement (+/- ml)
50	50.0192	0.0192	0.056
90	90.0227	0.0227	0.063
100	100.0279	0.0279	0.063
110	110.0287	0.0287	0.073

Certificate of Calibration

NO. 20230328102

Name of Product:	Sound Level Meter
Model:	ST-25D
Manufacturer:	Scarlet Tech Co., Ltd.
Serial Number:	10340875
Specification:	Class 2
Conclusion:	Pass
Date of calibration:	2023-03-28
Due Date:	2024-03-27

Calibrated by:

Jim Lin



- I. This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass then, and applies only to the unit identified above.
- II. This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- III. This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech.

1. Preliminary inspection: OK
2. Type & serial No. of Microphone: AWA14421 - A000175
3. Adjustments to indicated sound levels:
Type of Calibrator B&K 4231
Sound Pressure Level 94.0 dB
Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB.
4. Measuring up limit: 138 dBA.
5. Frequency weighting (Acoustic signal tests for Z weighting, other electric signal tests)

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz			Frequency weighting / dB		
	A	C	Z				A	C	Z
20	-50.8	-6.4	0.3	1000			0.0	0.0	0.0
315	-39.7	-3.2	0.1	2000			1.2	-0.2	0.0
63	-26.3	-0.8	0.1	4000			1.0	-0.8	0.0
125	-16.2	-0.2	0.0	8000			-1.0	-2.9	0.0
250	-8.7	0.0	0.0	12500			-4.1	-6.0	0.0
500	-3.3	0.0	0.0	/			/	/	/

6. Self-generated noise

Microphone installed: 37.4 dBA

Microphone replaced by electrical input signal device

23.1 dB (A)	33.9 dB (C)	40.8 dB (Z)
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7. F&S Weighting

Rate of the F weighting decrease (dB/s)	34.9
Rate of the S weighting decrease (dB/s)	4.3
Deviation of F&S	0.0

8. Level Linearity (A-weighting at frequency 1 kHz)

(Total measuring range: 33 dBA - 138 dBA, frequency 1 kHz):

Reference level range (frequency 1 kHz):

① 10 dB Interval

Signal	37.0	44.0	54.0	64.1	74.0	84.0	94.0	104.0	114.0	124.0	134.0
Indicating value dB(A)	37.0	44.0	54.0	64.1	74.1	84.0	94.0	103.9	114.0	124.2	134.1
Full scale deviation (dB)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	-0.1	0.0	0.2	0.1

Max error at 10 dB interval 0.2 dB

②1 dB interval

Upper Limit	134.0	135.0	136.0	137.0	138.0
Indicating value dB(A)	134.1	135.0	136.0	137.1	138.0
Full scale deviation (dB)	0.1	0.0	0.0	0.1	0.0
Lower Limit	33.0	34.0	35.0	36.0	37.0
Indicating value dB(A)	33.1	34.1	35.1	36.0	37.0
Full scale deviation (dB)	0.1	0.1	0.1	0.0	0.0

Max error at 1 dB- 10 dB interval 0.2 dB

9. Tone burst response (A Weighting)

Single Toneburst duration /ms	Toneburst response /dB				
	LAFmax-LA	LASmax-LA	LAEL-LA	LAeqT-LA	
500	-0.1	-4.0	-3.1	-7.0	
200	-1.0	-7.5	-7.0	-7.0	
2	-18.0	-27.1	-27.1	-7.1	
0.25	-27.1	/	-36.1	-7.1	

10. Overload indication: Pass

11. C-weighting peak sound level

Number of cycles in test signals	Nominal frequency of test signal/Hz	(LCpeak-LC)/dB		tolerance limits : class 2/dB
		Reference level range	Reference difference	
		4dB low of upper limit		
one	31.5	3.0	2.5	±3.0
one	500	3.6	3.5	±2.0
one	8000	3.5	3.4	±3.0
Positive half cycle	500	2.3	2.3	±2.0
negative half cycle	500	2.2	2.3	±2.0

12. Statistical analysis function

Indicated sound level of sweep signal maximum: 120 dB

Sweep amplitude: 40 dB

Measurement period: 60 s; Measurement duration: 180 s

Index	(dB)		
	SLM Reading	Expected Reading	Deviation
LAeq	110.4	110.4	0.0
L5	118.0	118.0	0.0
L10	116.0	116.0	0.0
L50	99.9	100.0	-0.1
L90	84.0	84.0	0.0
L95	82.0	82.0	0.0

13. SD card function: Pass

References:

- IEC 61672-1:2013 Electroacoustics-Sound Level Meters - Part 1: Specifications
IEC 61260-1:2014 Electroacoustics-Octave-band and fractional-octave-band filters - Part 1: Specifications
IEC 61252:2017 Electroacoustics-Specifications for personal sound exposure meters

Environment conditions:

Air temperatura: 20 °C Relative humidity: 55 % Static pressure: 102.2 kPa

Certificate of Calibration

NO. 20230328008

Name of Product:	Sound Level Meter
Model:	ST-25D
Manufacturer:	Scarlet Tech Co., Ltd.
Serial Number:	10340883
Specification:	Class 2
Conclusion:	Pass
Date of calibration:	2023-03-28
Due Date:	2024-03-27

Calibrated by:

Jim Lin



- I. This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass then, and applies only to the unit identified above.
II. This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
III. This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech.

1. Preliminary inspection: OK

2. Type & serial No. of Microphone: AWA14421 – A000102

3. Adjustments to indicated sound levels:

Type of Calibrator B&K 4231

Sound Pressure Level 94.0 dB

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB.

4. Measuring up limit: 138 dBA.

5. Frequency weighting (Acoustic signal tests for Z weighting, other electric signal tests)

Nominal frequency /Hz	Frequency weighting / dB			Frequency weighting / dB		
	A	C	Z	A	C	Z
20	-50.7	-6.3	0.3	0.0	0.0	0.0
31.5	-39.6	-3.1	0.1	1.2	-0.1	0.0
63	-26.3	-0.9	0.1	1.0	-0.7	0.0
125	-16.2	-0.2	0.0	-1.0	-2.9	0.0
250	-8.7	0.0	0.0	-4.1	-6.0	-0.1
500	-3.3	0.0	0.0	/	/	/

6. Self-generated noise

Microphone Installed: 41.2 dBA

Microphone replaced by electrical input signal device

22.8 dB (A)	36.2dB (C)	42.8 dB (Z)
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7. F&S Weighting

Rate of the F weighting decrease (dB/s)	35.0
Rate of the S weighting decrease (dB/s)	4.3
Deviation of F&S	0.0

8. Level Linearity (A-weighting at frequency 1 kHz)

(Total measuring range: 33 dBA - 138 dBA, frequency 1 kHz):

Reference level range (frequency 1 kHz):

① 10 dB Interval

Signal	37.0	44.0	54.0	64.0	74.0	84.0	94.0	104.0	114.0	124.0	134.0
Indicating value dB(A)	37.0	44.0	54.0	64.0	74.0	84.1	94.0	103.9	114.0	124.2	134.1
Full scale deviation (dB)	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-0.1	0.0	0.2	0.1

Max error at 10 dB interval 0.2 dB

② 1 dB Interval

Upper Limit	134.0	135.0	136.0	137.0	138.0
Indicating value dB(A)	134.1	135.2	136.2	137.2	138.0
Full scale deviation (dB)	0.1	0.2	0.2	0.2	0.0
Lower Limit	33.0	34.0	35.0	36.0	37.0
Indicating value dB(A)	33.2	34.1	35.1	36.0	37.0
Full scale deviation (dB)	0.2	0.1	0.1	0.0	0.0

Max error at 1 dB- 10 dB interval 0.2 dB

9. Tone burst response (A Weighting)

Single Toneburst duration /ms	Toneburst response /dB			
	LAFmax-LA	LASmax-LA	LAE-LA	LAeqT-LA
500	-0.1	-4.0	-3.1	-7.0
200	-1.0	-7.5	-7.0	-7.0
2	-18.0	-27.1	-27.1	-7.1
0.25	-27.2	/	-36.1	-7.1

10. Overload indication: Pass

Scarlet Tech Co., Ltd.

4F-3, No. 347, Heping E Rd, 2nd Sec, DaAn District, Taipei City 106, Taiwan
info@scarlet.com.tw / www.scarlet-tech.com

Scarlet Tech Co., Ltd.

4F-3, No. 347, Heping E Rd, 2nd Sec, DaAn District, Taipei City 106, Taiwan
info@scarlet.com.tw / www.scarlet-tech.com

11. C-weighting peak sound level

Number of cycles in test signals	Nominal frequency of test signal/Hz	(LCpeak-LC)/dB			tolerance limits : class 2/dB
		Reference level range		Reference difference	
		4dB low of upper limit			
one	31.5	3.1		2.5	±3.0
one	500	3.6		3.5	±2.0
one	8000	3.0		3.4	±3.0
Positive half cycle	500	2.3		2.4	±2.0
negative half cycle	500	2.3		2.4	±2.0

12. Statistical analysis function

Indicated sound level of sweep signal maximum: 120 dB

Sweep amplitude: 40 dB

Measurement period: 60 s; Measurement duration: 180 s

Index	(dB)		
	SLM Reading	Expected Reading	Deviation
L _{Aeq}	110.4	110.4	0.0
L ₅	118.0	118.0	0.0
L ₁₀	116.0	116.0	0.0
L ₅₀	99.9	100.0	-0.1
L ₉₀	84.0	84.0	0.0
L ₉₅	82.0	82.0	0.0

13. SD card function: Pass

References:

- IEC 61672-1:2013 Electroacoustics-Sound Level Meters - Part 1: Specifications
- IEC 61260-1:2014 Electroacoustics-Octave-band and fractional-octave-band filters - Part 1: Specifications
- IEC 61252:2017 Electroacoustics-Specifications for personal sound exposure meters

Environment conditions:

Air temperatura: 20 °C Relative humidity: 55 % Static pressure: 102.2 kPa