

1F.....	H5	48IFHD.....	H12	62PLMBH.....	A45	68NTA-X-MIX.....	E6
2GF.....	H5	50GHSV.....	J16	62PLMSP.....	A47	68P.....	G26
3GF.....	H5	53GH.....	J16	62PLP.....	A5	68PLCK.....	B23
4CB-SR.....	L5	54GH.....	J16	62PLPBH.....	A5	68PLCKI.....	B23
9-DC.....	L6	55GH.....	J16	62PLS.....	A55	68PLM.....	A41
14FL.....	H5	56PSG.....	G24	62PLSBH.....	A56	68PLMSP.....	A42
14FS.....	H5	56RBSG.....	E15	62PMT.....	D5	68PLPR.....	A7
14FSV.....	H5	59CA.....	G11	62PMTBH.....	D5	68PLPSP.....	A25
14FSX.....	H5	59HD.....	G33	62PMTBHR.....	D5	68PLP-X-0.....	A6
16-CB.....	L5	59P.....	G24	62PTBH.....	G25	68PLS.....	A50
18-DC.....	L6	60AB.....	E12	62PTC.....	E9	68PLSSP.....	A51
20.....	I4	60C.....	G6	62RB.....	E15	68PMT.....	D6
22.....	I4	60NTA.....	E5	62TF.....	E9	68PMTBH.....	D6
22BH.....	I4	60P.....	G24	62VL.....	E18	68PMT-X-M.....	D6
22CA.....	I4	60PB.....	G24	63NTA.....	E5	68PTC.....	E9
22CABH.....	I4	60PT.....	G6	63PLM.....	A47	68RB.....	E15
24B-CABINET.....	L6	60RB.....	E15	63PLP.....	A35	68RBSG.....	E15
24-CB.....	L5	60TF.....	E9	63PT.....	G7, G11, G25	68TF.....	E9
24M.....	F6	60VL.....	E18	66AB.....	E12	68VL.....	E18
24PLP.....	A32	60VLV.....	E18	66BJB.....	A29	69GH.....	J16
24PLPD.....	A33	61AB.....	E12	66C.....	G7	70GH.....	J16
26.....	I4	61C.....	G6	66CA.....	G12	71GH.....	J16
27.....	I4	61CA.....	G11	66HD.....	G31	75GH.....	J16
28.....	I4, I5	61CL.....	G6	66NBH.....	E5	76RB.....	E15
30GH.....	C35	61HD.....	G31	66NTA.....	E6	78GH.....	J16
31GH.....	C35	61NTA.....	E5	66P.....	G25	79GH.....	J16
31HB.....	C35	61P.....	G24	66PLM.....	A41	80GH.....	J16
32PLCK.....	B22	61PB.....	G24	66PLMBH.....	A45	81GH.....	J16
32PLP.....	A30	61PN.....	G24	66PLP.....	A6	82GH.....	J16
32PLPBH.....	A32	61PSGN.....	G24	66PLPBH.....	A5	83GH.....	J16
32PLPBHP.....	A38	61RB.....	E15	66PMT.....	D5	84GH.....	J16
32PLPDJ.....	A29	61RBSG.....	E15	66PMTBH.....	D6	88AC.....	H16
32PLPDJB.....	A28	61TF.....	E9	66PTC.....	E9	88GH.....	J16
32PLPDRC.....	A37	61VL.....	E18	66RBSV.....	E15	90GH.....	J16
32PLPRC.....	A37	62AB.....	E12	66VL.....	E18	93-FB-BPD.....	M5
32PLPSP.....	A36	62ABH.....	E12	67PLM.....	A46	94GH.....	J16
32PTC.....	D11	62ANBH.....	E5	67PLP.....	A36	95GH.....	J17
37PTCSP.....	D12	62C.....	G6	67PLS.....	A57	96GH.....	J17
40B-CABINET.....	L7	62CA.....	G11	67RBSG.....	E15	97HC.....	I8
41FL.....	H6	62CABH.....	G11	68BJB.....	A28	97P.....	G26
41FS.....	H6	62CBH.....	G7	68BJBD.....	A29	98GH.....	J17
41FX.....	H6	62HD.....	G31	68BJBT.....	A29	98GHSV.....	J17
41IF.....	H12	62HDBH.....	G31	68C.....	G7	99GH.....	J17
42F.....	H6	62NBH.....	E5	68CA.....	G12	99GHSV.....	J17
42IFHD.....	H12	62NFBH.....	E5	68HB.....	I8	101GHSV.....	J17
43F.....	H6	62NTA.....	E5	68HB-X-MI.....	J14	102-F-XX-BPD.....	M4
46F.....	H7	62P.....	G24, G25	68HB-X-MIX.....	I8	112.....	J12
46IFHD.....	H12	62PBH.....	G25	68HD.....	G32	122HBL.....	I8
48F.....	H7	62PCA.....	G11, G25	68LF.....	A9	122PLMSP.....	A47
48F-X-MI.....	J14	62PCABH.....	G11, G25	68LFR.....	A7	125HB.....	I8
48F-X-MIX.....	H7	62PLM.....	A45	68NTA-X-MI.....	J14	125HBL.....	I8



125HBSLV ..... I9	169PLMX ..... A43	179HD ..... G32	264AB ..... E12
126HBL ..... I9	169PLS ..... A52, A53	179PMT ..... D9	264C ..... G8
127HB ..... I9	169PLSX ..... A53	179PMTNS ..... D9	264CA ..... G12
128HBSLV ..... I9	169PMT ..... D7	179PMTR ..... D9	264NTA ..... E6
129HB ..... I9	169PMTBH ..... D7	179VL ..... E19	265AB ..... E12
139HB ..... I10	169PMTL ..... D7	189PMTR ..... D9	265C ..... G8
144F ..... H8	169PMTNS ..... D7	207ACBH ..... E13, J5	265CA ..... G12
145F ..... H8	169PMTNS-X-M ..... D7	207P ..... J5	265NTA ..... E6
146HBLFSV ..... I10	169PMTR ..... D7	208-FSS-BPD ..... M5	269C ..... G8
147F ..... H8	169PS ..... G28	208P ..... J5	269CA ..... G13
149F ..... H8	169PTCNS ..... E10	209P ..... J5	269HB ..... I11
149F-X-MI ..... J14	169VL ..... E19	210P ..... J5	269PMT ..... D7
149F-X-MIX ..... H9	170C ..... G9	211P ..... J5	269TF ..... E10
150F ..... H9	170CA ..... G13	212P ..... J5	270AB ..... E13
151F ..... H9	170HD ..... G32	213P ..... J6	270C ..... G9
155F ..... H9	170P ..... G29	215PN ..... J6	270CA ..... G13
159F ..... H9	170PMT ..... D8	215PNL ..... J6	270NTA ..... E7
159F-X-MI ..... J14	170PMTNS ..... D8	216P ..... J6	271 ..... E14
159F-X-MIX ..... H10	170VL ..... E19	218B-BPD ..... M3	279HB ..... I11
164C ..... G8	171C ..... G9	218P ..... J6	309P ..... C32
164CA ..... G12	171CA ..... G13	219P ..... J6	313GH ..... C35
164HD ..... G31	171HB ..... I10	220 ..... I5	316GH ..... C35
164P ..... G28	171HD ..... G32	220P ..... J7	316P ..... C33
164PLM ..... A46	171P ..... G29	222P ..... J7	318P ..... C32
164PLP ..... A9	171PLM ..... A43, A44	222P-X-MI ..... J14	322HB ..... C32
164PLS ..... A56	171PLS ..... A53, A54	222P-X-MIX ..... J11	322PLPSP ..... A37
164PMT ..... D6	171PMT ..... D8	224 ..... I5	325GH ..... C35
164PTC ..... E9	171PMTNS ..... D8	225 ..... I5	325GHSV ..... C35
164VL ..... E19	171PTCNS ..... E10	226-BPD ..... M5	325HB ..... C33
165C ..... G8	171VL ..... E19	226RB-BPD ..... M5	326HB ..... C33
165CA ..... G12	172C ..... G9	228 ..... I5	328HB ..... C35
165HD ..... G31	172CA ..... G13	229 ..... I5	329HB ..... C34
165PLM ..... A46	172HD ..... G32	230 ..... I6	347PLP ..... A33
165PLMBH ..... A46	172P ..... G29	231 ..... I6	362HB ..... C34
165PLP ..... A10	172PLM ..... A44, A45	232 ..... I6	362PLP ..... A31
165PLS ..... A56	172PLS ..... A54, A55	233 ..... I6	362PLPD ..... A32
165PMT ..... D6	172PMT ..... D8	237 ..... I6	362PLPDSP ..... A35
165PMTBH ..... D6	172PMTNS ..... D8	238 ..... I6	362PLPSP ..... A35
165PTC ..... E9	172PTCNS ..... E10	244F ..... H8	362PTC ..... D11
166FSV ..... H10	172VL ..... E19	244IFHD ..... H12	364HB ..... C32
168C ..... G8	174-F-BPD ..... M3	245IFHD ..... H13	364PLP ..... A31
168CA ..... G13	176C ..... G9	249F ..... H8	364PTC ..... D11
169C ..... G8	176CA ..... G14	249IF ..... H13	365HB ..... C32
169CA ..... G13	177C ..... G9	250IFHD ..... H13	365PLP ..... A30, A31
169HB-X-MI ..... J14	177CA ..... G14	251IFHD ..... H13	365PLPBH ..... A32
169HB-X-MIX ..... I10	177HD ..... G33	252IFHD ..... H13	365PTC ..... D11
169HD ..... G32	177P ..... G29	255IFHD ..... H13	367-FH-BPD ..... M4
169LP ..... G28	179C ..... G9	255M ..... F5	368-FH-BPD ..... M4
169P ..... G28	179CA ..... G14	256F ..... H10	368PLP ..... A26
169PLM ..... A42, A43	179HB ..... I10	259F ..... H9	368PLPD ..... A27
169PLMBJ ..... A47	179HB-X-MI ..... I11, J14	259IFHD ..... H13	368PTC ..... D11



369PLP.....	A21	411FS .....	H12	2491FHD .....	H13	BMB.....	G21
369PLPBJ .....	A28	415-N.....	L3	6302 .....	C9	BTMB .....	G21
369PLPBJB .....	A28	415-S.....	L3	6304 .....	C8	BU .....	C19, C28
369PLPO .....	A60	485F .....	H7	6306 .....	C8	BVG4PLOCK .....	K43
369PLPSP .....	A33	525-F-BPD.....	M5	6307 .....	C11	BVGC.....	K39
369PLPSPX .....	A34	639C.....	G9	6315.....	C5	BVGL .....	K41
369PLPTJ .....	A29	639CA.....	G14	6316.....	C5	BVGTC .....	K39
369PLPTJB.....	A28	639F .....	H10	6322 .....	C11	BVGTL.....	K41
369PLPX .....	A22	639PLM.....	A47	6325 .....	C6	C2PMTB.....	D16
369PTC .....	D11	639PLP.....	A36, A37	6326 .....	C11	C3BMB .....	G18
369PTCSP .....	D12	639PLS.....	A57	6340 .....	C9	C3PB .....	A12
370HB .....	C34	639PM.....	D9	6351 .....	C10	C3PMTB.....	D16
370PLP.....	A27	639PMT.....	D9	6366 .....	C9	C6PB .....	A11
370PTC .....	D11	640F .....	H10	6380 .....	C11	C8BMB .....	G18
371PLP.....	A25	640QSF.....	H16	6382 .....	C10	C8UPMTB .....	D16
371PLPSP.....	A34, A35	640QSFCR.....	H16	6383 .....	C10, C11	C63LPB.....	A12
371PTC .....	D12	660FHD.....	H10	6388 .....	C10	C63PB .....	A11
371PTCSP .....	D13	661FHD.....	H10	6503 .....	C7, C8	C64PB .....	A11
372HB .....	C34	664FHD.....	H10	6505 .....	C5	C64SPB.....	A11
372PLP.....	A24	682C .....	G9	6508 .....	C7	C68PB .....	A11
372PLPSP.....	A34	682CA.....	G14	6509 .....	C6, C7	C68SPB.....	A12
372PTC .....	D12	682VL.....	E19	6521 .....	C6	CAP .....	C19
372PTCSP .....	D13	685HB .....	I8	6548 .....	C11	CBMB .....	G17
376PLPBJ.....	A29	685VLV .....	E18	6579 .....	C6	CD43 .....	J10
377PLP.....	A24	880AC.....	H16	ACT-P-X-KIT .....	K37	COPPER TUBING.....	L7
377PTC .....	D12	881AC.....	H16	ACT-SS-X-KIT.....	K37	COR4BMB.....	G19
379PLP.....	A22	901GH .....	J17	ADJ-CB.....	L5	COR4PB.....	A14
379PLPSP.....	A34	945TH-BPD.....	M5	AQRT.....	C24	COR4PBD .....	A14
379PTC .....	D12	1163-60-BPD .....	J17	AVC1 .....	H15	COR8PB.....	A14
391P .....	G26	1163-61-BPD.....	J17	AVCS4D-4 .....	H16	COR8PBD .....	A14
391PSS .....	G26	1200P .....	J7	AVE1 .....	H15	CORPB.....	A14
392P .....	G26	1201P .....	J8	AVT2.....	H15	CORPBD .....	A14
392PSS .....	G26	1202P .....	J7	AVT3.....	H15	CR-001 .....	H16
393P .....	G26	1203P .....	J7	AVTS .....	H15	CU .....	C18
393PD .....	G27	1204P .....	J8	AVTS4 .....	H16	DC601.....	K59
393PDSS.....	G27	1295HB.....	I9	AVTS6 .....	H16	DC602 .....	K60
393PSS .....	G26	1495F .....	H9	AVTSL .....	H15	DC603 .....	K60
394P .....	G27	1595F .....	H10	AVU1 .....	H15	DC604 .....	K60
394PD .....	G27	1695HB.....	I10	AVU2 .....	H15	DC606 .....	K60
394PDSS.....	G27	1695VLV .....	E19	AVU2BH .....	H15	DC607 .....	K60
394PSS .....	G27	1725HB.....	I10	AVUIFI .....	H15	DCR601.....	K60
398P .....	G27	1795HB.....	I10	AVUR3.....	H16	DD44 .....	J10
398PD .....	G28	2200P .....	J7	AVUS.....	H16	EBMB .....	G18
398PDSS.....	G28	2200PDE .....	J8	AVUS3.....	H16	EPB .....	A10
398PSS .....	G27	2201P .....	J8	AVUS3BH.....	H15	ERHD .....	D5
400-S-TIP .....	L3	2202P .....	J7	AVUS4D .....	H16	ES.....	D5
410.....	L3	2203P .....	J7	AVUSE .....	H15	EU .....	C16, C27
410-N.....	L3	2205P .....	J8	BG441-NBL .....	L4	F2PMTB.....	D15
410-S.....	L3	2214P .....	J8	BG442-SBL .....	L4	F3BMB .....	G16
410-SV.....	L3	2224P .....	J8	BG443-NBL.....	L4	F3HF .....	J10
411FF .....	H12	2225P .....	J8	BG444-SBL .....	L4	F3HG.....	J10

F3PB .....	A8	FG43 .....	J11	NV106C .....	K57	SAE 010111 .....	H6
F3PMTB .....	D15	FHG4 .....	J11	NV106CA .....	K57	SAE 010112 .....	H10
F4BMB .....	G16	FNMB .....	G21	NV107P .....	K57	SAE 010113 .....	H5
F4PB .....	A9	FNPB .....	A15	NV108P .....	K57	SAE 010114 .....	H5
F8BMB .....	G16	FPB .....	A7	NV109P .....	K57	SAE 010165 .....	H5
F8PB .....	A8	G4BMB .....	G17	NV311P .....	G29, K57	SAE 010166 .....	H5
F8UPMTB .....	D15	G4PB .....	A6	NV312P .....	G29, K57	SAE 010167 .....	H5
F23PB .....	A8	GBMB .....	G17	OR .....	C29	SAE 010201 .....	H9
F28PB .....	A9	GG44 .....	J11	PLMC .....	A47	SAE 010202 .....	H8
FA .....	C18	GR .....	C29	PLPHBF4 .....	A7	SAE 010203 .....	H9
FBMB .....	G16	HBMB .....	G16	PLSC .....	A57	SAE 010302 .....	H9
FC .....	C18, C28	HHP3 .....	J11	PMCE .....	F4	SAE 010401 .....	H8
FC601 .....	B25	HP3 .....	J12	PMTCE .....	F4	SAE 010424 .....	H9
FC602 .....	B25	HPB .....	A5	PNEU-CAB .....	L7	SAE 010425 .....	H8
FC608 .....	B25	HPMTB .....	D15	PNMB .....	G21	SAE 010501 .....	H8
FC701 .....	B20	HV104C .....	K56	PSB .....	L7	SAE 040101 .....	H12
FC702 .....	B20	HV104C-KIT .....	K56	PSBJ708 .....	B31	SAE 040102 .....	H12
FC705 .....	B20	JBMB .....	G18	PSBJ731 .....	B31	SAE 040103 .....	H12
FC708 .....	B20	JPB .....	A10	PSPE731 .....	B31	SAE 040110 .....	H12
FC731 .....	B5	JPMTB .....	D15	PSPJ731 .....	B31	SAE 040202 .....	H13
FC832 .....	B17	KMMOO4 .....	J12	PTC-001 .....	M3	SAE 040203 .....	H13
FC836 .....	B18	LSR-STAND .....	L6	PTC-001RB .....	M3	SAE 040302 .....	H13
FC908 .....	B27	LV91 .....	E21	PTR34 .....	J12	SAE 040401 .....	H12
FCB832 .....	B17	MBVG .....	K45	PV607 .....	K54	SAE 040424 .....	H13
FCC731 .....	B5	MC .....	C16, C27	PV608 .....	K54	SAE 040425 .....	H13
FCCB731 .....	B6	ME .....	C20, C27	PV609 .....	K54	SAE 040427 .....	H13
FCCI731 .....	B5	MES .....	C17	PVMB-001 .....	K54	SAE 060101 BA .....	G6
FCCS731 .....	B12, B13	MMO444 .....	J12	R3BMB .....	G19	SAE 060102 BA .....	G7
FCCSI731 .....	B12	MMS443 .....	J12	R63PB .....	A12	SAE 060103 BA .....	G7
FCCSP731 .....	B15	MR .....	C28	R64PB .....	A13	SAE 060110 .....	G6
FCCSPI731 .....	B15	MRO434 .....	J12	R68PB .....	A12	SAE 060111 .....	G6
FCI701 .....	B20	MRS .....	C17	RBMB .....	G18	SAE 060115 .....	G6
FCI702 .....	B20	MT .....	C28	RD .....	C19	SAE 060201 BA .....	G8
FCIC908 .....	B27	MTS .....	C17	S3BMB .....	G19	SAE 060202 BA .....	G8
FCK701C .....	B7	MV200 .....	K52	S8UPMTB .....	D16	SAE 060203 BA .....	G9
FCKC731 .....	B6	MV308 .....	B29	S63PB .....	A13	SAE 060401 BA .....	G8
FCKCB731 .....	B7	MV309 .....	B29	S64PB .....	A13	SAE 060424 BA .....	G9
FCKCI731 .....	B7	MV608 .....	K52	S68PB .....	A14	SAE 060425 BA .....	G9
FCM731 .....	B9	MV609 .....	K52	S32633-BPD .....	M3	SAE 100101 BA .....	E5
FCMB731 .....	B10	MV708 .....	K47	S75015-BPD .....	M3	SAE 100102 BA .....	E6
FCMI731 .....	B9	MV709 .....	K47	S75046-BPD .....	M3	SAE 100103 BA .....	E6
FCMK731 .....	B10	MVV308 .....	B29	SAE 010101 .....	H6	SAE 100110 .....	E5
FCMS731 .....	B13	MVV309 .....	B29	SAE 010102 .....	H7	SAE 100115 .....	E5
FCMSI731 .....	B13	NS .....	C29	SAE 010103 .....	H7	SAE 100201 BA .....	E6
FCMSP731 .....	B15	NV101F .....	K56	SAE 010104 .....	H6	SAE 100202 BA .....	E7
FCMSPI731 .....	B15	NV102F .....	K56	SAE 010105 .....	H10	SAE 100203 BA .....	E7
FCPM832 .....	B18	NV103F .....	K56	SAE 010106 .....	H10	SAE 100302 BA .....	E7
FE .....	C19, C28	NV104C .....	K56	SAE 010107 .....	H10	SAE 100401 BA .....	E6
FF .....	C18	NV104CA .....	K56	SAE 010108 .....	H5	SAE 100424 BA .....	E7
FF33 .....	J10	NV105C .....	K56	SAE 010109 .....	H10	SAE 100425 BA .....	E7
FF44 .....	J11	NV105CA .....	K56	SAE 010110 .....	H6	SAE 120101 BA .....	E12

SAE 120102 BA .....	E12	V304CA .....	K59	W371PLP .....	A24	XVP500HP .....	K30
SAE 120103 BA .....	E12	V401P .....	K59	W372PLP .....	A23	XVP500P .....	K6
SAE 120111 .....	E12	V402P .....	K59	W379PLP .....	A22	XVP501P .....	K9
SAE 120115 .....	E12	V403P .....	K59	WBMB .....	G17	XVP502CS .....	K26
SAE 120201 BA .....	E12	V404P .....	E21	WBMPB .....	A5, G17	XVP502P .....	K11
SAE 120202 BA .....	E13	V404PH .....	E21	WE6PB .....	A10	XVP502SS .....	K34
SAE 120203 BA .....	E13	V405P .....	E21	WG4PB .....	A5	XVP506HP .....	K31
SAE 120302 BA .....	E13	V406P .....	K59	WGG44 .....	J12	XVP510P .....	K16
SAE 120401 BA .....	E12	V407P .....	K59	WPB .....	A5	XVV500P .....	K6
SAE 120424 BA .....	E13	V408NTA .....	E21	WY .....	C16	XVV501P .....	K9
SAE 120425 BA .....	E13	V409F .....	E21	X50CT .....	L7	XVV502P .....	K11
SBMB .....	G19	V410NTA .....	E21	XV500CS .....	K26	XVVP500P .....	K6
SC .....	C24	V412F .....	E21	XV500CS-X-04 .....	K26	XVVP501P .....	K9
SC4U .....	A14	VC .....	C21, B23	XV500CS-X-21 .....	K27	XVVP502P .....	K11
SC4UD .....	A14	VC-001 .....	H16	XV500HP .....	K30		
SC8U .....	A14	VEU .....	C23, C13	XV500P .....	K6		
SC8UD .....	A14	VFC .....	C13, C23, C36	XV500P-HB .....	K22		
SPV104C-KIT .....	K56	VFE .....	C12, C22, C36	XV500P-X-04 .....	K7		
ST .....	C20	VMC .....	C13, C23, C36	XV500P-X-21 .....	K7		
STX-P-1-125 .....	K50	VME .....	C12, C22, C36	XV501P .....	K9		
STX-P-1-225 .....	K50	VUC .....	C12, C23, C36	XV501P-X-04 .....	K9		
SV404P .....	E21	VS68AB .....	E12	XV501P-X-21 .....	K9		
T2HFB .....	G20	VS68NTA .....	E6	XV501SS .....	K32		
T2HGB .....	G20	VS176NTA .....	E6	XV502CS .....	K26		
T23HFB .....	G20	VS269AB .....	E13	XV502CS-X-21 .....	K27		
T23UB .....	G22	VS269NTA .....	E7	XV502P .....	K11		
T24HGB .....	G21	VS271AB .....	E13	XV502P-X-04 .....	K11		
T28HFB .....	G20	VS271NTA .....	E7	XV502P-X-ACT .....	K36		
TAF .....	C18	VS272AB .....	E13	XV502P-X-SUB .....	K37		
TC-1000-BPD .....	M3	VS272NTA .....	E7	XV502SS .....	K34		
TC-1050-BPD .....	M3	VS279AB .....	E13	XV502SS-X-20 .....	K34		
TCB .....	C20	VS279NTA .....	E7	XV502SS-X-21 .....	K34		
TEB .....	C20	VTEU .....	C23	XV502SS-X-ACT .....	K36		
TEPB .....	A15	VUC .....	C23, C12, C12	XV502SS-X-SUB .....	K37		
TEU .....	C19	VUCPB .....	C13	XV506CS .....	K28		
TFA .....	C18	W68LF .....	A6, A7, A8	XV506HP .....	K31		
TMB .....	G22	W68PLCK .....	B22	XV506P .....	K13		
TMC .....	C18	W68PLCKI .....	B22	XV509P .....	K14		
TPL .....	C20	W68PLP .....	A6	XV510P .....	K16		
TRBMB .....	G22	W68PLPSP .....	A25	XV510P-X-04 .....	K16		
TRPB .....	A15	W169PLP .....	A10	XV510P-X-21 .....	K16		
TS .....	C24, C29	W169PLPNS .....	A11	XV520P .....	K17		
TSC .....	C21	W171PLP .....	A12	XV533P .....	K19		
TU .....	C16, C28	W172PLP .....	A13	XV540P .....	K19		
UC .....	C17, C27	W368PLP .....	A26	XV590P .....	K21		
US5 .....	H5	W368PLPD .....	A26	XV590P-X-04 .....	K21		
V203F .....	K59	W369PLP .....	A20	XV591P .....	K21		
V204F .....	K59	W369PLPBJ .....	A27	XV591P-X-04 .....	K21		
V303C .....	K59	W369PLPO .....	A60	XV600P .....	K24		
V303CA .....	K59	W369PLPTJ .....	A29	XV633P .....	K24		
V304C .....	K59	W369PLPX .....	A21	XVP500CS .....	K26		





## Parker Safety Guide for Selecting and Using Hose, Tubing, Fittings and Related Accessories

Parker Publication No. 4400-B.1

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**WARNING: Failure or improper selection or improper use of hose, tubing, fittings, assemblies or related accessories (“Products”) can cause death, personal injury and property damage. Possible consequences of failure or improper selection or improper use of these Products include but are not limited to:**

- Fittings thrown off at high speed.
- High velocity fluid discharge.
- Explosion or burning of the conveyed fluid.
- Electrocutation from high voltage electric powerlines.
- Contact with suddenly moving or falling objects that are controlled by the conveyed fluid.
- Injections by high-pressure fluid discharge.
- Dangerously whipping Hose.
- Contact with conveyed fluids that may be hot, cold, toxic or otherwise injurious.
- Sparking or explosion caused by static electricity buildup or other sources of electricity.
- Sparking or explosion while spraying paint or flammable liquids.
- Injuries resulting from inhalation, ingestion or exposure to fluids.

Before selecting or using any of these Products, it is important that you read and follow the instructions below. Only Hose from Parker’s Stratoflex Products Division is approved for in flight aerospace applications, and no other Hose can be used for such in flight applications.

### 1.0 GENERAL INSTRUCTIONS

- 1.1 Scope:** This safety guide provides instructions for selecting and using (including assembling, installing, and maintaining) these Products. For convenience, all rubber and/or thermoplastic products commonly called “hose” or “tubing” are called “Hose” in this safety guide. All assemblies made with Hose are called “Hose Assemblies”. All products commonly called “fittings” or “couplings” are called “Fittings”. All related accessories (including crimping and swaging machines and tooling) are called “Related Accessories”. This safety guide is a supplement to and is to be used with, the specific Parker publications for the specific Hose, Fittings and Related Accessories that are being considered for use.
- 1.2 Fail-Safe:** Hose, and Hose Assemblies and Fittings can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of the Hose or Hose Assembly or Fitting will not endanger persons or property.
- 1.3 Distribution:** Provide a copy of this safety guide to each person that is responsible for selecting or using Hose and Fitting products. Do not select or use Parker Hose or Fittings without thoroughly reading and understanding this safety guide as well as the specific Parker publications for the products considered or selected.
- 1.4 User Responsibility:** Due to the wide variety of operating conditions and applications for Hose and Fittings, Parker and its distributors do not represent or warrant that any particular Hose or Fitting is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing, is solely responsible for:
- Making the final selection of the Hose and Fitting.
  - Assuring that the user’s requirements are met and that the application presents no health or safety hazards.
  - Providing all appropriate health and safety warnings on the equipment on which the Hose and Fittings are used.
  - Assuring compliance with all applicable government and industry standards.

- 1.5 Additional Questions:** Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to [www.parker.com](http://www.parker.com), for telephone numbers of the appropriate technical service department.

### 2.0 HOSE AND FITTING SELECTION INSTRUCTIONS

- 2.1 Electrical Conductivity:** Certain applications require that the Hose be nonconductive to prevent electrical current flow. Other applications require the Hose and the Fitting and the Hose/Fitting interface to be sufficiently conductive to drain off static electricity. Extreme care must be exercised when selecting Hose and Fittings for these or any other applications in which electrical conductivity or nonconductivity is a factor.
- The electrical conductivity or nonconductivity of Hose and Fittings is dependent upon many factors and may be susceptible to change. These factors include but are not limited to the various materials used to make the Hose and the Fittings, Fitting finish (some Fitting finishes are electrically conductive while others are nonconductive), manufacturing methods (including moisture control), how the Fittings contact the Hose, age and amount of deterioration or damage or other changes, moisture content of the Hose at any particular time, and other factors.
- The following are considerations for electrically nonconductive and conductive Hose. For other applications consult the individual catalog pages and the appropriate industry or regulatory standards for proper selection.
- 2.1.1 Electrically Nonconductive Hose:** Certain applications require that the Hose be nonconductive to prevent electrical current flow or to maintain electrical isolation. For these applications that require Hose to be electrically nonconductive, including but not limited to applications near high voltage electric lines, only special nonconductive Hose can be used. The manufacturer of the equipment in which the nonconductive Hose is to be used must be consulted to be certain that the Hose and Fittings that are selected are proper for the application. Do not use any Parker Hose or Fitting for any such application requiring nonconductive Hose, including but not limited to applications near high voltage electric lines, unless (i) the application is expressly approved in the Parker technical publication for the product, (ii) the Hose is marked “nonconductive”, and (iii) the manufacturer of the equipment on which the Hose is to be used specifically approves the particular Parker Hose and Fitting for such use.
- 2.1.2 Electrically Conductive Hose:** Parker manufactures special Hose for certain applications that require electrically conductive Hose.
- Parker manufactures special Hose for conveying paint in airless paint spraying applications. This Hose is labeled “Electrically Conductive Airless Paint Spray Hose” on its layline and packaging. This Hose must be properly connected to the appropriate Parker Fittings and properly grounded in order to dissipate dangerous static charge buildup, which occurs in all airless paint spraying applications. Do not use any other Hose for airless paint spraying, even if electrically conductive. Use of any other Hose or failure to properly connect the Hose can cause a fire or an explosion resulting in death, personal injury, and property damage.
- Parker manufactures a special Hose for certain compressed natural gas (“CNG”) applications where static electricity buildup may occur. Parker CNG Hose assemblies comply with AGA

Requirements 1-93, “Hoses for Natural Gas Vehicles and Fuel Dispensers”. This Hose is labeled “Electrically Conductive for CNG Use” on its layline and packaging. This Hose must be properly connected to the appropriate Parker Fittings and properly grounded in order to dissipate dangerous static charge buildup, which occurs in, for example, high velocity CNG dispensing or transfer. Do not use any other Hose for CNG applications where static charge buildup may occur, even if electrically conductive. Use of other Hoses in CNG applications or failure to properly connect or ground this Hose can cause a fire or an explosion resulting in death, personal injury, and property damage. Care must also be taken to protect against CNG permeation through the Hose wall. See section 2.6, Permeation, for more information. Parker CNG Hose is intended for dispenser and vehicle use at a maximum temperature of 180°F. Parker CNG Hose should not be used in confined spaces or unventilated areas or areas exceeding 180°F. Final assemblies must be tested for leaks. CNG Hose Assemblies should be tested on a monthly basis for conductivity per AGA 1-93. Parker manufactures special Hose for aerospace in flight applications. Aerospace in flight applications employing Hose to transmit fuel, lubricating fluids and hydraulic fluids require a special Hose with a conductive inner tube. This Hose for in flight applications is available only from Parker’s Stratoflex Products Division. Do not use any other Parker Hose for in flight applications, even if electrically conductive. Use of other Hoses for in flight applications or failure to properly connect or ground this Hose can cause a fire or an explosion resulting in death, personal injury, and property damage. These Hose assemblies for in flight applications must meet all applicable aerospace industry, aircraft engine, and aircraft requirements.

- 2.2 Pressure:** Hose selection must be made so that the published maximum recommended working pressure of the Hose is equal to or greater than the maximum system pressure. Surge pressures or peak transient pressures in the system must be below the published maximum working pressure for the Hose. Surge pressures and peak pressures can usually only be determined by sensitive electrical instrumentation that measures and indicates pressures at millisecond intervals. Mechanical pressure gauges indicate only average pressures and cannot be used to determine surge pressures or peak transient pressures. Published burst pressure ratings for Hose is for manufacturing test purposes only and is no indication that the Product can be used in applications at the burst pressure or otherwise above the published maximum recommended working pressure.
- 2.3 Suction:** Hoses used for suction applications must be selected to insure that the Hose will withstand the vacuum and pressure of the system. Improperly selected Hose may collapse in suction application.
- 2.4 Temperature:** Be certain that fluid and ambient temperatures, both steady and transient, do not exceed the limitations of the Hose. Temperatures below and above the recommended limit can degrade Hose to a point where a failure may occur and release fluid. Properly insulate and protect the Hose Assembly when routing near hot objects (e.g. manifolds). Do not use any Hose in any application where failure of the Hose could result in the conveyed fluids (or vapors or mist from the conveyed fluids) contacting any open flame, molten metal, or other potential fire ignition source that could cause burning or explosion of the conveyed fluids or vapors.
- 2.5 Fluid Compatibility:** Hose Assembly selection must assure compatibility of the Hose tube, cover, reinforcement, and Fittings with the fluid media used. See the fluid compatibility chart in the Parker publication for the product being considered or used. This information is offered only as a guide. Actual service life can only be determined by the end user by testing under all extreme conditions and other analysis.
- Hose that is chemically compatible with a particular fluid must be assembled using Fittings and adapters containing likewise compatible seals.
- 2.6 Permeation:** Permeation (that is, seepage through the Hose) will occur from inside the Hose to outside when Hose is used with gases, liquid and gas fuels, and refrigerants (including but not limited to such materials as helium, diesel fuel, gasoline, natural gas, or LPG). This permeation may result in high concentrations of vapors which are potentially flammable, explosive, or toxic, and in loss of fluid. Dangerous explosions, fires, and other hazards can result when using the wrong Hose for such applications. The system designer must take into account the fact that this permeation will take place and must not use Hose if this permeation could be hazardous. The system designer must take into account all legal, government, insurance, or any other special regulations which govern the use of fuels and refrigerants. Never use a Hose even though the fluid compatibility is acceptable without considering the potential hazardous effects that can result from permeation through the Hose Assembly.
- Permeation of moisture from outside the Hose to inside the Hose will also occur in Hose assemblies, regardless of internal pressure. If this moisture permeation would have detrimental effects (particularly, but not limited to refrigeration and air conditioning systems), incorporation of sufficient drying capacity in the system or other appropriate system safeguards should be selected and used.
- 2.7 Size:** Transmission of power by means of pressurized fluid varies with pressure and rate of flow. The size of the components must be adequate to keep pressure losses to a minimum and avoid damage due to heat generation or excessive fluid velocity.
- 2.8 Routing:** Attention must be given to optimum routing to minimize inherent problems (kinking or flow restriction due to Hose collapse, twisting of the Hose, proximity to hot objects or heat sources).



- 2.9 Environment:** Care must be taken to insure that the Hose and Fittings are either compatible with or protected from the environment (that is, surrounding conditions) to which they are exposed. Environmental conditions including but not limited to ultraviolet radiation, sunlight, heat, ozone, moisture, water, salt water, chemicals, and air pollutants can cause degradation and premature failure.
- 2.10 Mechanical Loads:** External forces can significantly reduce Hose life or cause failure. Mechanical loads which must be considered include excessive flexing, twist, kinking, tensile or side loads, bend radius, and vibration. Use of swivel type Fittings or adapters may be required to insure no twist is put into the Hose. Unusual applications may require special testing prior to Hose selection.
- 2.11 Physical Damage:** Care must be taken to protect Hose from wear, snagging, kinking, bending smaller than minimum bend radius, and cutting, any of which can cause premature Hose failure. Any Hose that has been kinked or bent to a radius smaller than the minimum bend radius, and any Hose that has been cut or is cracked or is otherwise damaged, should be removed and discarded.
- 2.12 Proper End Fitting:** See instructions 3.2 through 3.5. These recommendations may be substantiated by testing to industry standards such as SAE J517 for hydraulic applications, or MIL-A-5070, AS1339, or AS3517 for Hoses from Parker's Stratoflex Products Division for aerospace applications.
- 2.13 Length:** When establishing a proper Hose length, motion absorption, Hose length changes due to pressure, and Hose and machine tolerances and movement must be considered.
- 2.14 Specifications and Standards:** When selecting Hose and Fittings, government, industry, and Parker specifications and recommendations must be reviewed and followed as applicable.
- 2.15 Hose Cleanliness:** Hose components may vary in cleanliness levels. Care must be taken to insure that the Hose Assembly selected has an adequate level of cleanliness for the application.
- 2.16 Fire Resistant Fluids:** Some fire resistant fluids that are to be conveyed by Hose require use of the same type of Hose as used with petroleum base fluids. Some such fluids require a special Hose, while a few fluids will not work with any Hose at all. See instructions 2.5 and 1.5. The wrong Hose may fail after a very short service. In addition, all liquids but pure water may burn fiercely under certain conditions, and even pure water leakage may be hazardous.
- 2.17 Radiant Heat:** Hose can be heated to destruction without contact by such nearby items as hot manifolds or molten metal. The same heat source may then initiate a fire. This can occur despite the presence of cool air around the Hose.
- 2.18 Welding or Brazing:** When using a torch or arc-welder in close proximity to hydraulic lines, the hydraulic lines should be removed or shielded with appropriate fire resistant materials. Flame or weld spatter could burn through the Hose and possibly ignite escaping fluid resulting in a catastrophic failure. Heating of plated parts, including Hose Fittings and adapters, above 450°F (232°C) such as during welding, brazing, or soldering may emit deadly gases.
- 2.19 Atomic Radiation:** Atomic radiation affects all materials used in Hose assemblies. Since the long-term effects may be unknown, do not expose Hose assemblies to atomic radiation.
- 2.20 Aerospace Applications:** The only Hose and Fittings that may be used for in flight aerospace applications are those available from Parker's Stratoflex Products Division. Do not use any other Hose or Fittings for in flight applications. Do not use any Hose or Fittings from Parker's Stratoflex Products Division with any other Hose or Fittings, unless expressly approved in writing by the engineering manager or chief engineer of Stratoflex Products Division and verified by the user's own testing and inspection to aerospace industry standards.
- 2.21 Unlocking Couplings:** Ball locking couplings or other couplings with disconnect sleeves can unintentionally disconnect if they are dragged over obstructions or if the sleeve is bumped or moved enough to cause disconnect. Threaded couplings should be considered where there is a potential for accidental uncoupling.
- 3.0 HOSE AND FITTING ASSEMBLY AND INSTALLATION INSTRUCTIONS**
- 3.1 Component Inspection:** Prior to assembly, a careful examination of the Hose and Fittings must be performed. All components must be checked for correct style, size, catalog number, and length. The Hose must be examined for cleanliness, obstructions, blisters, cover looseness, kinks, cracks, cuts or any other visible defects. Inspect the Fitting and sealing surfaces for burrs, nicks, corrosion or other imperfections. Do NOT use any component that displays any signs of nonconformance.
- 3.2 Hose and Fitting Assembly:** Do not assemble a Parker Fitting on a Parker Hose that is not specifically listed by Parker for that Fitting, unless authorized in writing by the engineering manager or chief engineer of the appropriate Parker division. Do not assemble a Parker Fitting on another manufacturer's Hose or a Parker Hose on another manufacturer's Fitting unless (i) the engineering manager or chief engineer of the appropriate Parker division approves the Assembly in writing or that combination is expressly approved in the appropriate Parker literature for the specific Parker product, and (ii) the user verifies the Assembly and the application through analysis and testing. For Parker Hose that does not specify a Parker Fitting, the user is solely responsible for the selection of the proper Fitting and Hose Assembly procedures. See instruction 1.4. The Parker published instructions must be followed for assembling the Fittings on the Hose. These instructions are provided in the Parker Fitting catalog for the specific Parker Fitting being used, or by calling 1-800-CPARKER, or at [www.parker.com](http://www.parker.com).
- 3.3 Related Accessories:** Do not crimp or swage any Parker Hose or Fitting with anything but the listed swage or crimp machine and dies in accordance with Parker published instructions. Do not crimp or swage another manufacturer's Fitting with a Parker crimp or swage die unless authorized in writing by the engineering manager or chief engineer of the appropriate Parker division.
- 3.4 Parts:** Do not use any Parker Fitting part (including but not limited to socket, shell, nipple, or insert) except with the correct Parker mating parts, in accordance with Parker published instructions, unless authorized in writing by the engineering manager or chief engineer of the appropriate Parker division.
- 3.5 Reusable/Permanent:** Do not reuse any field attachable (reusable) Hose Fitting that has blown or pulled off a Hose. Do not reuse a Parker permanent Hose Fitting (crimped or swaged) or any part thereof. Complete Hose Assemblies may only be reused after proper inspection under section 4.0. Do not assemble Fittings to any previously used hydraulic Hose that was in service, for use in a fluid power application.
- 3.6 Pre-Installation Inspection:** Prior to installation, a careful examination of the Hose Assembly must be performed. Inspect the Hose Assembly for any damage or defects. Do NOT use any Hose Assembly that displays any signs of nonconformance.
- 3.7 Minimum Bend Radius:** Installation of a Hose at less than the minimum listed bend radius may significantly reduce the Hose life. Particular attention must be given to preclude sharp bending at the Hose to Fitting juncture. Any bending during installation at less than the minimum bend radius must be avoided. If any Hose is kinked during installation, the Hose must be discarded.
- 3.8 Twist Angle and Orientation:** Hose Assembly installation must be such that relative motion of machine components does not produce twisting.
- 3.9 Securement:** In many applications, it may be necessary to restrain, protect, or guide the Hose to protect it from damage by unnecessary flexing, pressure surges, and contact with other mechanical components. Care must be taken to insure such restraints do not introduce additional stress or wear points.
- 3.10 Proper Connection of Ports:** Proper physical installation of the Hose Assembly requires a correctly installed port connection insuring that no twist or torque is transferred to the Hose when the Fittings are being tightened or otherwise during use.
- 3.11 External Damage:** Proper installation is not complete without insuring that tensile loads, side loads, kinking, flattening, potential abrasion, thread damage, or damage to sealing surfaces are corrected or eliminated. See instruction 2.10.
- 3.12 System Checkout:** All air entrapment must be eliminated and the system pressurized to the maximum system pressure (at or below the Hose maximum working pressure) and checked for proper function and freedom from leaks. Personnel must stay out of potential hazardous areas while testing and using.
- 3.13 Routing:** The Hose Assembly should be routed in such a manner so if a failure does occur, the escaping media will not cause personal injury or property damage. In addition, if fluid media comes in contact with hot surfaces, open flame, or sparks, a fire or explosion may occur. See section 2.4.
- 4.0 HOSE AND FITTING MAINTENANCE AND REPLACEMENT INSTRUCTIONS**
- 4.1** Even with proper selection and installation, Hose life may be significantly reduced without a continuing maintenance program. The severity of the application, risk potential from a possible Hose failure, and experience with any Hose failures in the application or in similar applications should determine the frequency of the inspection and the replacement for the Products so that Products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at minimum, must include instructions 4.2 through 4.7.
- 4.2 Visual Inspection Hose/Fitting:** Any of the following conditions require immediate shut down and replacement of the Hose Assembly:
- Fitting slippage on Hose,
  - Damaged, cracked, cut or abraded cover (any reinforcement exposed);
  - Hard, stiff, heat cracked, or charred Hose;
  - Cracked, damaged, or badly corroded Fittings;
  - Leaks at Fitting or in Hose;
  - Kinked, crushed, flattened or twisted Hose; and
  - Blistered, soft, degraded, or loose cover.
- 4.3 Visual Inspection All Other:** The following items must be tightened, repaired, corrected or replaced as required:
- Leaking port conditions;
  - Excess dirt buildup;
  - Worn clamps, guards or shields; and
  - System fluid level, fluid type, and any air entrapment.
- 4.4 Functional Test:** Operate the system at maximum operating pressure and check for possible malfunctions and leaks. Personnel must avoid potential hazardous areas while testing and using the system. See section 2.2.
- 4.5 Replacement Intervals:** Hose assemblies and elastomeric seals used on Hose Fittings and adapters will eventually age, harden, wear and deteriorate under thermal cycling and compression set. Hose Assemblies and elastomeric seals should be inspected and replaced at specific replacement intervals, based on previous service life, government or industry recommendations, or when failures could result in unacceptable downtime, damage, or injury risk. See section 1.2.
- 4.6 Hose Inspection and Failure:** Hydraulic power is accomplished by utilizing high-pressure fluids to transfer energy and do work. Hoses, Fittings, and Hose Assemblies all contribute to this by transmitting fluids at high pressures. Fluids under pressure can be dangerous and potentially lethal and, therefore, extreme caution must be exercised when working with fluids under pressure and handling the Hoses transporting the fluids. From time to time, Hose Assemblies will fail if they are not replaced at proper time intervals. Usually these failures are the result of some form of misapplication, abuse, wear, or failure to perform proper maintenance. When Hoses fail, generally the high-pressure fluids inside escape in a stream which may or may not be visible to the user. Under no circumstances should the user attempt to locate the leak by "feeling" with their hands or any other part of their body. High-pressure fluids can and will penetrate the skin and cause severe tissue damage and possibly loss of limb. Even seemingly minor hydraulic fluid injection injuries must be treated immediately by a physician with knowledge of the tissue damaging properties of hydraulic fluid. If a Hose failure occurs, immediately shut down the equipment and leave the area until pressure has been completely released from the Hose Assembly. Simply shutting down the hydraulic pump may or may not eliminate the pressure in the Hose Assembly. Many times check valves, etc., are employed in a system and can cause pressure to remain in a Hose Assembly even when pumps or equipment are not operating. Tiny holes in the Hose, commonly known as pinholes, can eject small, dangerously powerful but hard to see streams of hydraulic fluid. It may take several minutes or even hours for the pressure to be relieved so that the Hose Assembly may be examined safely. Once the pressure has been reduced to zero, the Hose Assembly may be taken off the equipment and examined. It must always be replaced if a failure has occurred. Never attempt to patch or repair a Hose Assembly that has failed. Consult the nearest Parker distributor or the appropriate Parker division for Hose Assembly replacement information. Never touch or examine a failed Hose Assembly unless it is obvious that the Hose no longer contains fluid under pressure. The high-pressure fluid is extremely dangerous and can cause serious and potentially fatal injury.
- 4.7 Elastomeric seals:** Elastomeric seals will eventually age, harden, wear and deteriorate under thermal cycling and compression set. Elastomeric seals should be inspected and replaced.
- 4.8 Refrigerant gases:** Special care should be taken when working with refrigeration systems. Sudden escape of refrigerant gases can cause blindness if the escaping gases contact the eye and can cause freezing or other severe injuries if it contacts any other portion of the body.
- 4.9 Compressed natural gas (CNG):** Parker CNG Hose Assemblies should be tested after installation and before use, and at least on a monthly basis per AGA 1-93 Section 4.2 "Visual Inspection Hose/Fitting". The recommended procedure is to pressurize the Hose and check for leaks and to visually inspect the Hose for damage. Caution: Matches, candles, open flame or other sources of ignition shall not be used for Hose inspection. Leak check solutions should be rinsed off after use.



## OFFER OF SALE

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors ("Seller") are hereby offered for sale at prices to be established by Seller. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods or work described will be referred to as "Products".

1. **Terms and Conditions.** Seller's willingness to offer Products, or accept an order for Products, to or from Buyer is expressly conditioned on Buyer's assent to these Terms and Conditions and to the terms and conditions found on-line at [www.parker.com/sale-terms/](http://www.parker.com/sale-terms/). Seller objects to any contrary or additional term or condition of Buyer's order or any other document issued by Buyer.

2. **Price Adjustments; Payments.** Prices stated on the reverse side or preceding pages of this document are valid for 30 days. After 30 days, Seller may change prices to reflect any increase in its costs resulting from state, federal or local legislation, price increases from its suppliers, or any change in the rate, charge, or classification of any carrier. The prices stated on the reverse or preceding pages of this document do not include any sales, use, or other taxes unless so stated specifically. Unless otherwise specified by Seller, all prices are F.O.B. Seller's facility, and payment is due 30 days from the date of invoice. After 30 days, Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. **Delivery Dates; Title and Risk; Shipment.** All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the manner of shipment, title to any products and risk of loss or damage shall pass to Buyer upon tender to the carrier at Seller's facility (i.e., when it's on the truck, it's yours). Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's changes in shipping, product specifications or in accordance with Section 13, herein.

4. **Warranty.** Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of twelve months from the date of delivery to Buyer or 2,000 hours of normal use, whichever occurs first. This warranty is made only to Buyer and does not extend to anyone to whom Products are sold after purchased from Seller. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

5. **Claims; Commencement of Actions.** Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 60 days after delivery or, in the case of an alleged breach of warranty, within 30 days after the date within the war-

ranty period on which the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for any amount due to Seller from Buyer) must be commenced within thirteen months from the date of tender of delivery by Seller or, for a cause of action based upon an alleged breach of warranty, within thirteen months from the date within the warranty period on which the defect is or should have been discovered by Buyer.

6. **LIMITATION OF LIABILITY.** UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.

7. **Contingencies.** Seller shall not be liable for any default or delay in performance if caused by circumstances beyond the reasonable control of Seller.

8. **User Responsibility.** The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

9. **Loss to Buyer's Property.** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

10. **Special Tooling.** A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

11. **Buyer's Obligation; Rights of Seller.** To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest. Seller shall have a security interest in, and lien upon, any property of Buyer in Seller's possession as security for the payment of any amounts owed to Seller by Buyer.

12. **Improper use and Indemnity.** Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

13. **Cancellations and Changes.** Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

14. **Limitation on Assignment.** Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

15. **Entire Agreement.** This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of the agreement. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

16. **Waiver and Severability.** Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

17. **Termination.** This agreement may be terminated by Seller for any reason and at any time by giving Buyer thirty (30) days written notice of termination. In addition, Seller may by written notice immediately terminate this agreement for the following: (a) Buyer commits a breach of any provision of this agreement (b) the appointment of a trustee, receiver or custodian for all or any part of Buyer's property (c) the filing of a petition for relief in bankruptcy of the other Party on its own behalf, or by a third party (d) an assignment for the benefit of creditors, or (e) the dissolution or liquidation of the Buyer.

18. **Governing Law.** This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement. Disputes between the parties shall not be settled by arbitration unless, after a dispute has arisen, both parties expressly agree in writing to arbitrate the dispute.

19. **Indemnity for Infringement of Intellectual Property Rights.** Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

20. **Taxes.** Unless otherwise indicated, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of Products.

21. **Equal Opportunity Clause.** For the performance of government contracts and where dollar value of the Products exceed \$10,000, the equal employment opportunity clauses in Executive Order 11246, VEVRAA, and 41 C.F.R. §§ 60-1.4(a), 60-741.5(a), and 60-250.4, are hereby incorporated.