De igna ion: F2316 – 12 (Rea o ed 2022)

S anda d S eci ca ion fo Ai f ame Eme genc Pa ach e [1]

Thi anda d i i ed nde he ed de igna ion F2316; he n mbe immedia el follo ing he de igna ion indica e he ea of o iginal adop ion o , in he ca e of e i ion, he ea of la e i ion. A n mbe in pa en he e indica e he ea of la eapp o al. A pe c ip ep ilon (ε) indica e an edi o ial change ince he la e i ion o eapp o al.

1. Scope

1.1 Thi peci ca ion co e minim m e i emen fo he de ign, man fac e, and in alla ion of pa ach e fo ai - f ame . Ai f ame eme genc pa ach e add e ed in hi peci ca ion efe o pa ach e em de igned, man fac ed, and in alled o eco e he ai f ame and i oca pan a a i able a e of de cen . Thi peci ca ion i no applicable o deep- all pa ach e , pin eco e pa ach e , d og e pa ach e , o o he ai f ame eme genc ae od namic decele a o no peci call in ended fo afel lo e ing he ai f ame and oca pan o he g o nd. The peci ca ion i applicable o he e pe of pa ach e if he a e an in eg al pa of an ai f ame eme genc pa ach e em de igned o eco e he ai f ame and oca pan a a i able a e of de cen .

1.2 The al e a ed in SI ni a e o be ega ded a anda d. The e ma be al e gi en in pa en he e ha a e ma hema ical con e ion o inch-po nd ni . Val e in pa- en he e a e p o ided fo info ma ion onl and a e no con ide ed anda d.

1.2.1 No e ha i hin he a ia ion comm ni mi ed ni a e app op ia e in acco dance i h In e na ional Ci il A ia ion O gani a ion (ICAO) ag eemen . While he al e a ed in SI ni a e ega ded a anda d, ce ain al e ch a ai peed in kno and al i de in fee a e al o accep ed a anda d.

1.3 *Airframe emergency parachute recovery systems have become an acceptable means of greatly reducing the likelihood of serious injury or death in an in-flight emergency. Even though they have saved hundreds of lives in many different types of conditions, inherent danger of failure, even if properly designed, manufactured and installed, remains due to the countless permutations of random variables (attitude, altitude, accelerations, airspeed, weight, geographic location, etc.) that may exist at time of usage. The combination of these variables may negatively influence the life saving function of these airframe emergency parachute systems. They are designed to be a supplemental safety device and to be used at the discretion of the pilot when deemed to provide the best chance of survivability.*

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory requirements prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 The e a e o en l no efe enced doc men in hi peci ca ion.

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *ballistic device, n*—ma incl de ocke mo o , mo a , e plo i e p ojec ile, p ing, o o he o ed ene g de ice.

3.1.2 *completely opened parachute, n*— he pa ach e ha eached i ma im m de ign dimen ion fo he ime.

3.1.3 *parachute deployment, n*—p oce of pa ach e ac i- a ion and in a ion.

4. Materials and Manufacture

4.1 *Materials*—Ma e ial ed fo pa and a emblie , he fail e of hich co ld ad e el affec afe , m mee he follo ing condi ion :

4.1.1 Ma e ial hall be i able and d able fo he in ended e.

4.1.2 De ign al e (eng h) m be cho en o ha no c al pa i nde eng h a a e l of ma e ial a ia- ion o load concen a ion, o bo h.

4.1.3 The effec of en i onmen al condi ion , ch a empe a e and h midi , e pec ed in e ice m be aken in o acco n .

5. Reserved

5.1 Thi ec ion i being ed a a placeholde o main ain he p e io ec ion n mbe .

[1] Thi peci ca ion i nde he j i dic ion of ASTM Commi ee F37 on Ligh Spo Ai c af and i he di ec e pon ibili of S bcommi ee F37.70 on C o G ing.

G en edi ion app o ed Ap il 1, 2022. B bli hed Ap il 2022. O iginall app o ed in 2003. La p e io edi ion app o ed in 2014 a F2316 – 12 (2014). DOI: 10.1520/F2316-12R22.

6. Parachute System Design Requirements

6.1 *Strength Requirements:*

6.1.1 S eng h e i emen a e peci ed in e m of limi load (he ma im m load o be e pec ed in e ice) and l ima e load (limi load m l iplied b a p e c ibed fac o of afe).

6.1.1.1 Unle o he i e p o ided, p e c ibed load a e limi load .

6.1.1.2 Unle o he i e p o ided, an l ima e load fac o of afe of 1.5 m be ed.

6.1.2 S em e al a ion b anal i m e an accep ed comp a ional me hod ha ha been e i ed h o gh e ing. In o he ca e , load e ing m be cond c ed.

6.1.3 S em e al a ion b e ing m be ppo ed i h in men calib a ion e i ed b an applicable eigh and mea e eg la o bod , fo e ample, a e and fede al go e nmen .

6.2 *System Design*—The follo ing minim m pe fo mance anda d fo he ba ic pa ach e em hall be me .

6.2.1 *Parachute Strength Test*—A minim m of h ee c-ce fi l d op e of he pa ach e a embl hall be cond c ed nde l ima e load condi ion o demon a e he pa ach e' eng h. The ma im m pa ach e opening fo ce mea ed in he h ee e ill be he l ima e pa ach e opening load. A ne pa ach e a embl ma be ed fo each e . The eigh of he pa ach e a embl i incl ded in he e eigh . Da a ac i i ition hall be pe fo med fo each e and hall incl de eco ding of in a ion load a a fi nc ion of ime.

6.2.1.1 Fo a cce fi l d op e he pa ach e em m be able o ppo he l ima e load demon a ed d ing he d op e . No de imen al pe manen defo ma ion o damage ma oca ha p e en he em f om e ing i p po e. The pa ach e hall:

(1) Main ain a de cen a e a o belo i de igned a e of de cen fo a gi en eigh and al i de.

(2) Ha e comple el opened i hin i de igned pa ame e of ime.

6.2.1.2 An l ima e load fac o of afe of 1.5 i achie ed b cond c ing he pa ach e eng h e a follo :

(1) Parachute Strength Test with Aircraft in Flight, If he pa ach e i eng h e ed hile a ached o an ai c af in igh , he follo ing e pa ame e hall be applied:

Min. Te eigh = 1.25 Ai c af Ma im m G o Takeoff Weigh

Min. Te Speed = 1.1 Ai caf ' Ma im m In ended Pa a-ch e Deplo men Speed

NOTE 1, In hi e a ian , he fac o of afe i con ide ed applicable o he ene g of he ai c af . Ho e e , i i no pe mi ible o cale e e l b ing an ene g e a ion app oach.

(2) Parachute Strength Test with "Dead Weight" Payload, If he pa ach e i eng h e ed hile a ached o a dead eigh (den e ma , and, me al chain , a e , e c. and limi ed ol me), he follo ing e pa ame e hall be applied:

Min. Te eigh = Ai c af Ma im m G o Takeoff Weigh

Min. Te Speed = Ai caf ' Ma im m In ended Pa ach e Deplo men Speed

NOTE 2, Thi e me hod i b na e con e a i e, a a dead eigh doe no ho an pi ching o o a ion endenc ha ab o b ene g d ing he pa ach e opening h , a a eal ai c af al a doe . The efo e, e i h ma im m eigh and peed e l in l ima e load .

6.2.2 *Rate of Descent*—Ra e of de cen da a hall be e-co ded fo all e in 6.2.1. Thi da a ma be co ec ed fo he a ia ion in e ehicle eigh o de e mine he a e of de cen a he g o eigh of he peci c ai c af . De cen a e da a f om pa ach e canopie hall be co ec ed o 1500 m (5000 f) den i al i de and anda d empe a e. Ai c af man fac-e and pa ach e man fac e hall coo dina e ha e io inj o oca pan i nlikel hile landing nde pa ach e.

6.2.3 *Staged Deployment*—The pa ach e a embl hall be de igned o age he deplo men e ence in an o de l manne o ed ce he chance of en anglemen o imila malfi nc ion .

6.2.4 *Environmental Conditions*—The em m be e al a ed fo ope a ion in empe a e condi ion of 40 C o 48.9 C (40 F o 120 F).

6.3 *Installation Design*—A peci c Pa ach e In alla ion Man al (PIM) fo he in alla ion of a pa io la pa ach e em in o each ai c af model m be c ea ed. The PIM m p o ide fficien info ma ion o en e co ec in alla ion of he pa ach e em o he peci c ai f ame.

6.3.1 *Coordination*—Ai f ame and pa ach e man fac e m coo dina e and join l app o e he PIM fo co ec ne . De ign o con g a ion change ha impac he pa ach e in alla ion, pe fo mance, o ope abili e i e e-e al a ion ela i e o he e i emen of hi peci ca ion. Bo h ai f ame and pa ach e man fac e hall coo dina e he e an icipa ed change befo e implemen a ion. The e change hall be doc-men ed in a e i ed PIM.

6.3.2 *Weight and Balance*—The in alla ion of he pa ach e em m be acco n ed fo in he de ign da a of eigh and balance limi of he ai f ame.

6.3.3 *System Mounting*—The ha d a e ed o in all he pa ach e em hall no become loo ened o de ached a a e l of no mal ea and ea .

6.3.4 *Extraction Performance*—Ai f ame and pa ach e man fac e m coo dina e and ho ha he e ac ion de ice ill cleanl pene a e an co e ing o emo e he pa ach e em' co e , if an , and e ac he pa ach e a embl o fi ll pen ion line e ch (line ha connec he pa ach e canop o he ha ne e) i ho inhibi ing o damaging he pa ach e pon eg e . While i i ecogni ed ha he ai c af con g a ion i np edic able in an eme genc i a ion (fo e ample, b oken pa c ea ing deb i), all d e ca e m be aken o p o ide a pa h of lea e i ance a ming an e emel apid a e of depa e.

6.3.5 *Parachute Attachment to the Airframe*—The pa ach e a embl m be a ached o he p ima c e of he ai f ame i h an ai f ame a achmen ha ne ha ma be compo ed of a ingle ha ne ec ion o a e ie of ha ne ec ion . The ai f ame and pa ach e man fac e m coo dina e and ag ee o en e ha he pa ach e a achmen o he bjec ai f ame complie i h he follo ing condi ion :

6.3.5.1 Pa ach e deplo men ind ce ni e load di ib-ion o he ai f ame, la gel d e o geome ic loca ion of he ha ne a achmen poin . The ai f ame a achmen poin and

ai f ame a achmen ha ne fo each indi id al ai c af model m compl i h he ı l ima e pa ach e opening load mea- ı ed in he pa ach e eng h e de c ibed in 6.2.1. Thi load al ead con ain he e ı i ed afe fac o of 1.5.

6.3.5.2 The ha ne em and a ach poin m be con g ed in a manne ha p e en he ai c af in a de cen and landing a i ı de ha ma imi e he abili of he ai f ame ı c ı e o ab o b he an icipa ed landing load and minimi e he p obabili of inj o he oca pan .

6.3.5.3 The ai f ame a achmen ha ne m be o ed f om he in alled pa ach e o he ai f ame a achmen poin and eo ed in a manne ha ill p e en i f om impac ing no mal igh ope a ion . I m al o be ho n ha he ha ne ill be ı fficien l ipped f ee af e ac i a ion of he pa a- ch e em o en ı e ade ı a e fi nc ioning of he em.

6.3.5.4 The ai f ame a achmen ha ne de ign m mini- mi e he po en ial fo con ic i h he p opelle . If con ic i h he p opelle i ı na oidable b in alla ion de ign o ope a o in ı c ion ı ch a h ing do n he engine, he ai f ame a achmen ha ne m be man fac ı ed f om ma- e ial ha ield a ea onable likelihood of ı i ing a con ic i h he p opelle .

6.3.6 *Activating Housing Routing*—The pa ach e em m be 6.4(do-235.8(6.2354(doei. e ial)-269(no6.3.5.)-46.5i)-269i f)64.8(f)60(i(l f)64.8 .)-3179(The)doei. eai f ame afach ean d

bjeic ai f ame compien i h he codic ion:.

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11.2.1 *Installation and Size of Placard or Label*—The ai f ame man fac ı e hall pe manen l in all he a ning placa d o label in a manne de ned b hi peci ca ion and doc men ed in he PIM.

11.2.2 *Label Size and Color*—All placa d o label hall follo he colo a ion me hod de c ibed belo . The h ee i e of placa d o label ill add e diffe en loca ion fo in alla ion.

11.2.2.1 *Danger Placard*—Dange placa d o label hall be p in ed i h a ed bo de i h hi e (o e e e pe) le e i h a de c ip i e g aphic elemen .

(1) Danger Placard for Interior Parachute Installation—A 7.62 cm (3 in.) minim m iang la placa d o label i h he o d . Dange (ee ample placa d Fig. X1.1 of Appendi X1) m be placed adjacen o he pa ach e eg e poin fo enclo ed ai c af he e he pa ach e em ma no be i ible f om he e e io .

(2) Danger Placard for Exterior Parachute Installation—A 5.08 cm (2 in.) minim m iang la placa d o label (ee ample label Fig. X1.1

S3.1.1 The eme genc pa ach e em man fac e hall e abli h in pec ion and e nece a o en e ha each a icle p od ced confo m o he o iginal enginee ing peci ca ion , a de ned belo :

S3.1.1.1 In pec ion fo a ma e ial , p cha ed i em , and pa and a emblie p od ced b pplie , incl ding me hod ed o en e accep able ali of pa and a emblie ha canno be comple el in pec ed fo confo mi and ali hen deli e ed o he pa ach e man fac e ' facili .

S3.1.1.2 P od c ion in pec ion of indi id al pa and comple e a emblie , incl ding he iden i ca ion of an pecial man fac ing p oce e in ol ed, he mean ed o con ol he p oce e , and he nal e ali in pec ion of he comple ed eme genc pa ach e em.

S3.1.1.3 A nonconfo ming ma e ial e ie em ha incl de doc men a ion of pa di po i ion deci ion and a em o di po e of ejec ed pa .

S3.1.1.4 A em fo info ming compan in pec o of a en change in enginee ing d a ing , peci ca ion , and ali con ol p oced e .

APPENDIX

(Nonmandatory Information)

X1. SAMPLE OF LABELS (PLACARDS)

X1.1 The ample label ho n in Fig. X1.1 mee he e i emen p o ided in 11.2.2.1.

X1.2 The ample label ho n in Fig. X1.2 mee he e i emen p o ided in 11.2.2.2.

X1.3 The ample label ho n in Fig. X1.3 mee he e i emen p o ided in 11.2.2.3.

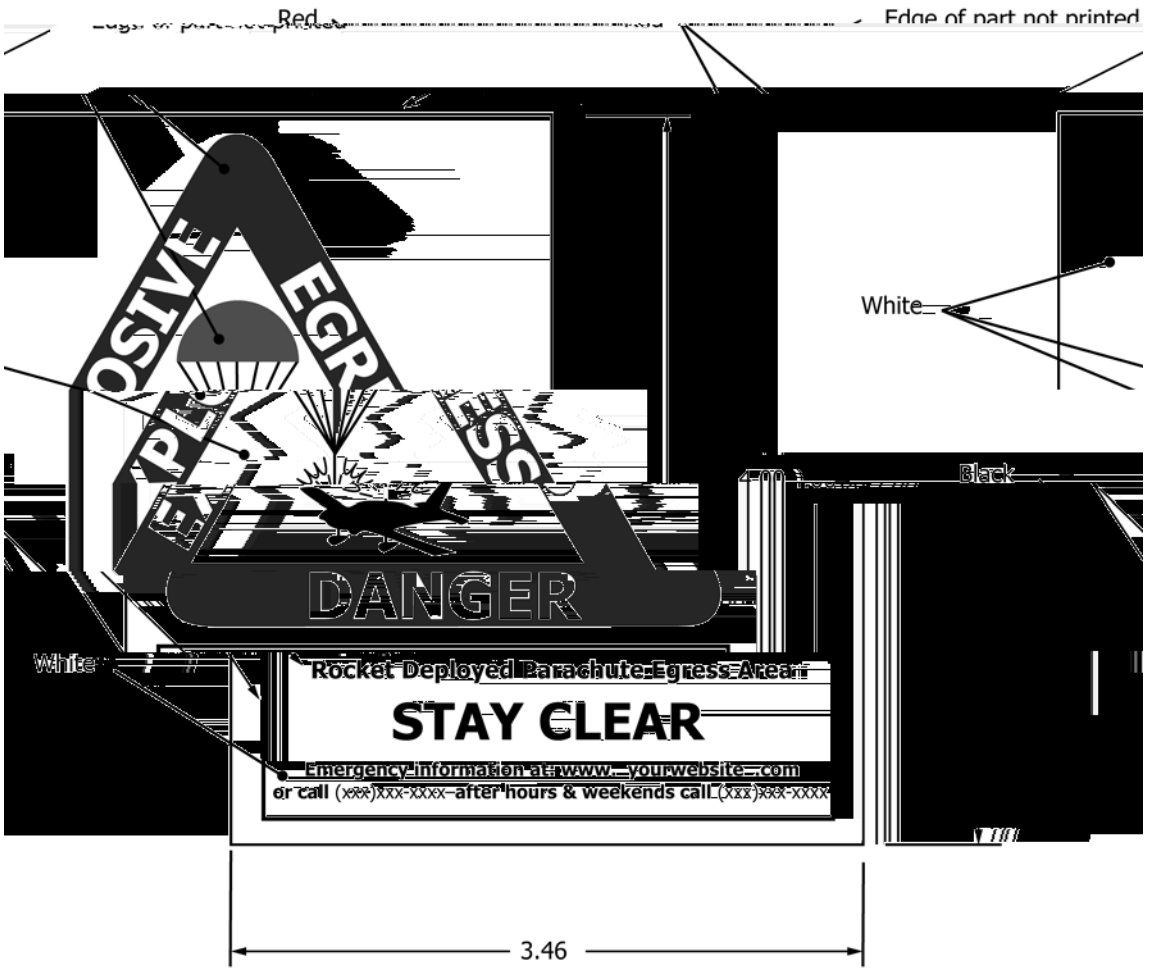

FIG. X1.1 Sam le Dange Label

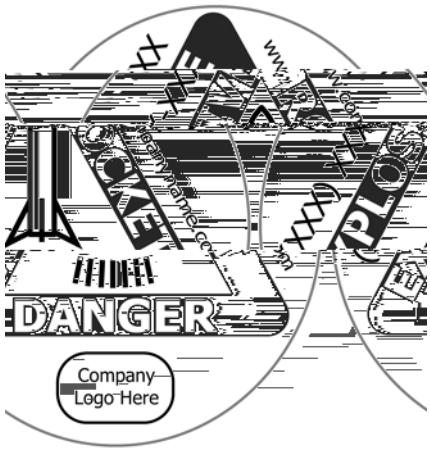

FIG. X1.2 Sam le Iden if ing Label

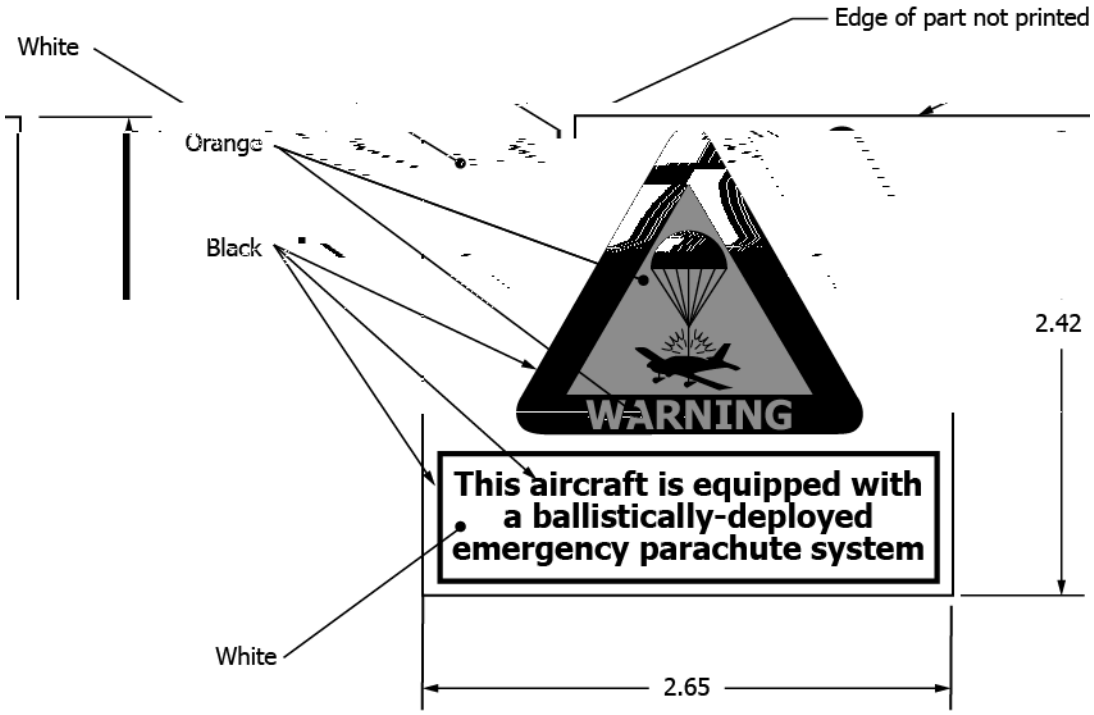

FIG. X1.3 Sam le Label