

DRAFT



Australian Government
Civil Aviation Safety Authority

ADVISORY CIRCULAR
AC 21-32 v1.0

Approval of equipment used for carriage of persons external to a rotorcraft

File ref: D21/443873

November 2024

DRAFT

Advisory circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Advisory circulars should always be read in conjunction with the relevant regulations.

Audience

This advisory circular (AC) applies to:

- operators of Australian registered rotorcraft conducting human external load operations
- maintenance organisations that modify rotorcraft for external load operations
- designers of rotorcraft modifications
- production approval holders for appliances that are to be used during external load operations.

Purpose

This AC provides guidance for the approval of personnel carrying device systems (PCDS) used with human external cargo (HEC) capable rotorcraft when performing HEC operations. The AC describes the methods of accepting or approving appliances used as part of an external load system.

To avoid duplication of content, this AC should be read in conjunction FAA Advisory Circulars 27.865 and 29.865, contained in FAA AC 27-1 and AC 29-2 respectively, that provide guidance for the airworthiness design requirements of external load systems. EASA acceptable means of compliance (AMC) for EASA CS-27 and CS-29 also provides valuable guidance relating to design criteria in relation to European Certification Specification (CS) 27.865 and 29.865.

For further information

For further information, contact CASA's Airworthiness Standards (telephone 131 757).

Status

This version of the AC is approved by the Branch Manager, Airworthiness and Engineering.

Table 1: Status

Version	Date	Details
v1.0		Initial AC.

Unless specified otherwise, all subregulations, regulations, Divisions, Subparts and Parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

Contents

1	Reference material	5
1.1	Acronyms	5
1.2	Definitions	5
1.3	References	7
1.4	Forms	8
2	Introduction	9
2.1	Overview	9
2.2	Frequently asked questions (FAQ)	12
3	Equipment approvals under Part 21	14
3.1	Assessment criteria	14
3.2	Approval "In any other manner approved by CASA"	15
3.3	Acceptable standards	15
3.4	European standards (EN)	15
3.5	National Fire Protection Agency (NFPA)	17
3.6	Alternative standards	18
4	Operational implementation	19
4.1	Update to the approved Exposition (Part 133) or Operations Manual (Part 138)	19
4.2	Aircraft compatibility	19
4.3	Risk mitigation	19
4.4	Training	20
4.5	Conditions	20
5	Equipment approval pathways under Part 21	22
5.1	Australian Parts manufacturer Approval (APMA) - Regulation 21.305(a)	22
5.2	Australian Technical Standard Order Authorisation - Regulation 21.305(b)	22
5.3	Type Certificate procedures - Regulation 21.305(c)	23
5.4	Approval of imported materials, parts and appliances - Regulation 21.305(d)	23
5.5	Approval in a manner prescribed by Part 21 MOS - Regulation 21.305(da)	24
5.6	Approval in any other manner approved by CASA - Regulation 21.305(e)	24
Appendix A	Rescue litter system	25



Acknowledgement of Country

The Civil Aviation Safety Authority (CASA) respectfully acknowledges the Traditional Custodians of the lands on which our offices are located and their continuing connection to land, water and community, and pays respect to Elders past, present and emerging.

Artwork: James Baban.

1 Reference material

1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

Table 2: Acronyms

Acronym	Description
AC	advisory circular
ARC	authorised release certificate
ATSO	Australian Technical Standard Order
ATSOA	Australian Technical Standard Order Authorisation
CASA	Civil Aviation Safety Authority
CASR	<i>Civil Aviation Safety Regulations 1998</i>
ETSO	European Technical Standard Order
ETSO	European Technical Standard Order Authorisation
HEC	human external cargo
MOS	Manual of Standards
PCDS	personnel carrying device system
RFM	rotorcraft flight manual
TSO	Technical Standard Order
TSO	Technical Standard Order Authorisation

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below. Where definitions from the civil aviation legislation have been reproduced for ease of reference, these are identified by 'grey shading'. Should there be a discrepancy between a definition given in this AC and the civil aviation legislation, the definition in the legislation prevails.

Table 3: Definitions

Term	Definition
air crew member	means a crew member for a flight of an aircraft (other than a flight crew member) who carries out a function during the flight relating to the safety of the operation of the aircraft, or the safety of the use of the aircraft. (CASR Dictionary Part 1)
appliance	Means any instrument, mechanism, equipment, part, apparatus, appurtenance, or accessory, including communication equipment, that is used or intended to be used in operating or controlling an aircraft in flight, is installed in or attached to the aircraft, and is not part of an airframe, engine or propeller.

Term	Definition
	(CASR Dictionary Part 1)
article	Means materials, parts, processes, or appliances, typically used in relation to an ATSO Authorisation. CASR 21.601(3)
ATSOA	A design approval and manufacturing authorisation issued under CASR Subpart 21.O against an Australian Technical Standard Order (ATSO), Technical Standard Order (TSO) published by the FAA or a European Technical Standard Order (ETSO).
attaching means	refers to items such as ropes, carabineers, shackles, etc. that attaches the PCDS to the hoist system or hook.
authorised release certificate	Means a document issued by a manufacturer or a maintainer to attest that a product meets its design criteria and has been manufactured or maintained (as the case may be) in accordance with relevant data and is in a serviceable condition. The legislative CASR definition is given by clause 18 of Part 2 of the CASR Dictionary.
complex PCDS	Any appliance that does not meet the definition of a Simple PCDS
flight crew member	means a crew member who is a pilot or flight engineer assigned to carry out duties essential to the operation of an aircraft during flight time. (CASR Dictionary Part 1)
human external cargo (HEC)	A person(s) that at some point in the operation is carried external to the rotorcraft. (Ref. FAA AC 29.865B)
installation	Refers to appliances, parts or materials that are included in the aircraft approved design and are fitted to the aircraft, in most cases with a maintenance certification by a person with the technical expertise required to perform the action. Items of equipment such as harnesses that are not part of the aircraft approved design that are attached to the aircraft hoist system are not considered to be installed.
part	Means an individual component or an assembly of components that is used on aircraft
personnel carrying device system (PCDS)	Any device or system that has the structural capability and features needed to safely transport occupants external to the rotorcraft during HEC operations. A PCDS includes, but is not limited to, safety harnesses, and rigid baskets or cages either attached to a hoist or cargo hook or mounted to the rotorcraft airframe. (Ref: FAA TSO 167)
production authorisation	An authorisation issued under CASR Part 21 for the production (manufacture) of any products, materials, parts or appliances.
simple PCDS	<ul style="list-style-type: none"> designed to restrain no more than a single person (e.g. hoist or cargo hook operator, task specialist, etc.) inside the cabin, or to restrain no more than two persons outside the cabin; and it is not a rigid structure such as a cage, a platform or a basket; and it complies with any of the following: <ul style="list-style-type: none"> the acceptable standards and associated requirements prescribed by the

Term	Definition
	Part 21 Manual of Standards: or <ul style="list-style-type: none"> – Approved under an ATSOA (including relevant TSOA and ETSOA); or – Approved by CASA under <i>CASR 21.305(e) in any other manner approved by CASA.</i>
task specialist	A task specialist, for an aerial work operation, means a crew member for a flight who carries out a function for the flight relating to the aerial work operation and is not a flight crew member or an air crew member for the flight. Ref. CASR 138.015.

1.3 References

Legislation

Legislation is available on the Federal Register of Legislation website <https://www.legislation.gov.au/>

Table 4: Legislation references

Document	Title
Part 21	Certification and airworthiness requirements for aircraft and parts
Part 133	Australian Air Transport Operations—Rotorcraft
Part 138	Aerial work operations

Advisory material

CASA's advisory materials are available at <https://www.casa.gov.au/publications-and-resources/guidance-materials>

Table 5: Advisory material references

Document	Title
AC 21-08	Approval of modification and repair designs under Subpart 21.M
AC 21-12	Classification of design changes
AC 21-15	Supplemental Type Certificates
AC 21-16	Approval of materials, parts, processes and appliances
AC 21-27	Manufacturing approval - overview
AC 21-601	Australian Technical Standard Order Authorisation
AC 138-01	Part 138 core concepts
AC 138-05	Aerial work risk management

Other reference material

Table 6: Other reference material

Document	Title
FAA AC 27-865	External Load Attaching Means (note: this AC is contained within FAA AC 27-1)
FAA AC 29-865	External Load Attaching Means (note: this AC is contained within FAA AC 29-2)
EASA CS-27.865/29.865	Acceptable Means of Compliance and Guidance Material - External loads
FAA AC 21-45	Commercial Parts
EASA AMC1 SPO.SPEC.HEC.105(b)	Acceptable Means of Compliance (AMC) and Guidance Material (GM) to Annex VIII Specialised operations [Part-SPO]
FAA SAIB SW-18-15	External Load Devices for Human External Cargo

1.4 Forms

CASA's forms are available at <http://www.casa.gov.au/forms>

Table 7: Forms

Form number	Title
Form 849	Application for CASR Part 21 production approval

2 Introduction

2.1 Overview

- 2.1.1 This AC provides guidance for the identification and approval of operational equipment used for the carriage of persons external to a rotorcraft. This type of activity is referred to as Human External Cargo or HEC.
- 2.1.2 HEC also encompasses the restraint of a person inside the cabin with open door operations, such as a hoist operator or task specialist.
- 2.1.3 Within the Parts 91, 133 and 138 Manuals of Standards (MOS) there are requirements for HEC equipment to be compliant with the requirements of, or approved under, Part 21 of CASR. Typically, this requirement applies to external load equipment, fittings, lines, safety harnesses, restraint straps and rescue harnesses.
- 2.1.4 Whenever a material, part, process, or appliance is required to be approved under Part 21, it may only be approved by the following means:
- under an Australian Parts Manufacturer Approval (APMA)
 - under an Australian Technical Standard Order Authorisation (ATSOA)
 - in conjunction with Type Certification procedures of an aircraft, engine or propeller
 - an imported item that meets the conditions of Subpart 21.N
 - as specified in the Part 21 MOS
 - in any other manner approved by CASA.
- 2.1.5 Section 5 of this AC provides further details relating to each of the above means of approval including the applicability of each method to HEC operations¹.

2.1.6 Types of equipment: simple and complex

- 2.1.6.1 A Personnel Carrying Device System (PCDS) used for the purposes of HEC ranges from simple textile full-body harnesses through complex rigid structures and cages designed to carry multiple occupants. EASA Acceptable Means of Compliance (AMC) for the CS-29 airworthiness standards makes a distinction between "simple" and "complex" PCDS. CASA legislation does not make the same distinction.
- 2.1.6.2 However, the terms simple and complex are useful when discussing approval pathways. For the purposes of this AC, a simple PCDS is considered to meet the following criteria:
- it is designed to restrain no more than a single person, such as a hoist or cargo hook operator, task specialist, etc., inside the cabin, or to restrain no more than two persons outside the cabin
 - it is not a rigid structure such as a cage, a platform or a basket
 - it complies with any of the following:
 - the acceptable standards and associated requirements prescribed by the Part 21 Manual of Standardsor
 - approved under an ATSOA (including relevant TSOA and ETSOA)

¹ Refer to regulation 21.305 of CASR.

or

- approved by CASA under CASR 21.305(e) in any other manner approved by CASA.

2.1.6.3 Items that meet the above criteria are approved in accordance with Part 21 and do not require further approval if the attaching aircraft system (hoist, belly hook, etc) is approved under Part 21 and is compatible with the equipment.

2.1.6.4 Equipment that does not meet the criteria is considered complex and will require a more detailed assessment by CASA. An overview of the pathways of approval for both simple and complex PCDS is given in figure 1 below with a more detailed summary provided in section 5 of this AC.

2.1.6.5 When referring to simple PCDS, the attaching means must also be considered and be approved in the same manner. Attaching means refers to items such as ropes, carabineers, shackles, etc. that attaches the simple PCDS to the hoist system or hook. The approval methods stated in 2.1.4 will also apply to the attaching means.

As of the date of this revision, the Part 21 Manual of Standards does not contain 'acceptable standards and associated requirements' related to simple PCDS. Section 3 provides a table of standards assessed by CASA and deemed acceptable that can be used in conjunction with other approval methods until such time the list can be transitioned to the Part 21 Manual Of Standards. A CASR 21.305(e) approval would be such a method.

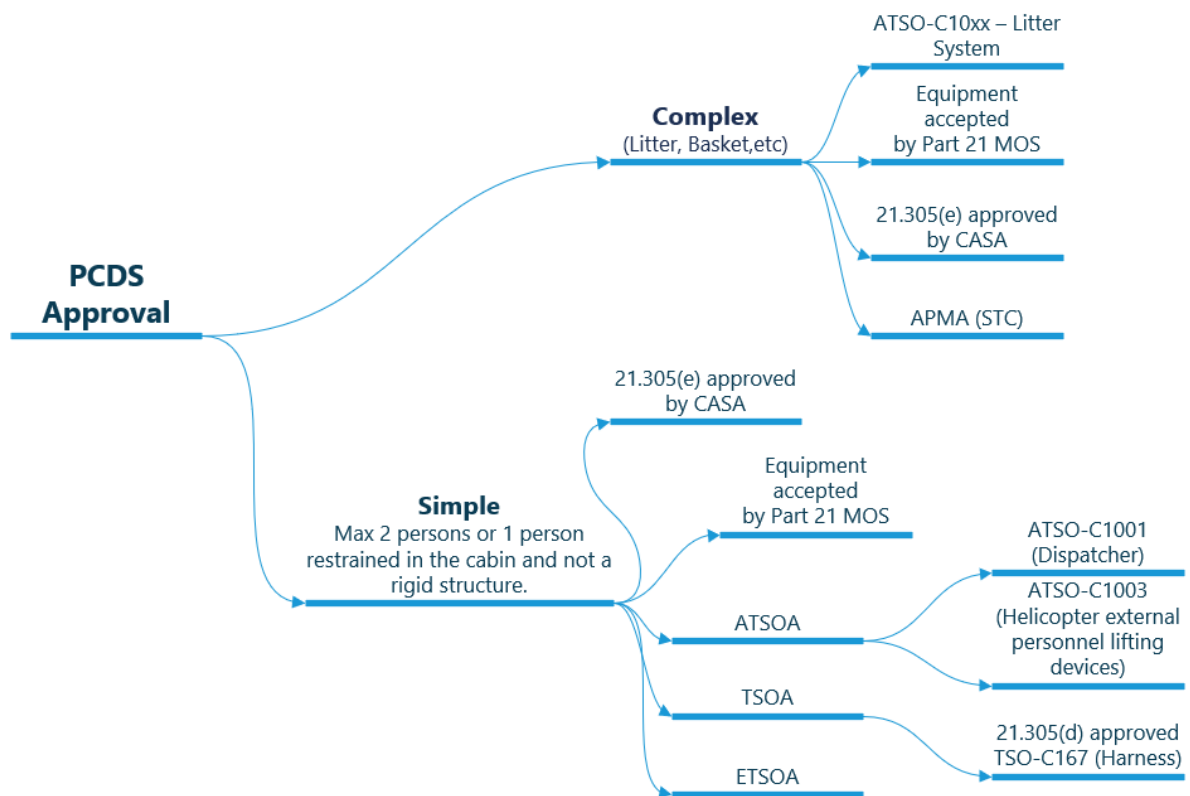


Figure 1: Overview of the pathways of approval for both simple and complex PCDS

*ATSO-C10xx - Litter systems is a reference to the standard provided in Appendix A of this AC which is anticipated to become a future published ATSO.

2.1.7 Applicable airworthiness standards

- 2.1.7.1 Depending on the application and the existing aircraft systems, HEC equipment may form part of the aircraft approved design or may be approved as standalone operational equipment.

As an illustration, a rigid platform used for the carriage of persons performing powerline inspections, where the installation requires the technical skills and certification of maintenance personnel is likely to be approved through a Supplemental Type Certificate (STC) and would form part of the approved design. Whereas a full body harness worn by rescue crew that attaches directly to an existing HEC approved hoist may be approved for use independent of the aircraft. (Compatibility with the aircraft systems must still be established). Compliance with the legislative requirements is generally more straightforward when the equipment is approved as a standalone item and this path is generally recommended where possible.

- 2.1.7.2 Equipment that forms part of the aircraft approved design will adopt the certification basis for the aircraft. EASA Certification Specifications (CS) 29 is one such example of a certification basis. CASA AC 21-08 - Approval of modification and repair designs under Subpart 21.M and AC 21-12 Classification of design changes provide further detail.
- 2.1.7.3 Standalone equipment does not adopt the certification basis of the aircraft, however, the equipment must not conflict or compromise the existing certification basis or invalidate the current certificate of airworthiness.
- 2.1.7.4 Regulation 27.865 and 29.865 of both FAA and EASA airworthiness standards will apply in all situations of HEC equipment approval. The requirements are discussed in later sections of this AC, but amongst other things, the PCDS must be reliable and approved. In this context, reliable is a reference to repeatable performance of the equipment to the level expected by the standard. To be approved (under Part 21), the PCDS must have the structural capability and personnel safety features essential for external occupant safety.
- 2.1.7.5 Relevant Australian Technical Standard Orders are currently published in the Part 21 MOS . Appendix A of this AC provides an acceptable standard for litter systems and is expected to be transitioned to an ATSO in the Part 21 MOS in the future. Section 5 of this AC discusses ATSO approvals in more detail.

2.1.8 Applicability of modifications

- 2.1.8.1 As equipment can only be approved under the methods identified in 2.1.4 above, the incorporation of unapproved materials, parts, processes and appliances in aircraft modifications are not within the scope of a Subpart 21.M approval.
- 2.1.8.2 It should be noted that equipment used for the purposes of Human External Cargo (HEC) is not eligible for inclusion in a modification as a Commercial Off The Shelf (COTS) part. Appendix C, subparagraph C.2.2.4 of AC 21-08 provides for the classification of COTS parts. HEC equipment is considered safety critical, required by the applicable airworthiness standards (27/29.865) and required by or under the applicable operational regulations. When referencing the classification of COTS parts these items are classified under 'd. Required operational instruments and equipment' and must be approved in a manner identified in 2.1.4.

2.1.9 Application for approval under Part 21

- 2.1.9.1 Where approval of standalone appliances and parts is required, an application can be made on a completed Form 849 and submitted to CASA. This form covers APMA, ATSO Authorisations and 'other' approvals as described throughout this AC.
- 2.1.9.2 Section 5 of this AC provides further detail on the requirements for approval under each approval type.

- 2.1.9.3 Applications for ATSOA can be made by an article manufacturer in accordance with the requirements of regulation 21.605.
- 2.1.9.4 Any person is eligible to apply for an APMA per regulation 21.303(2A).
- 2.1.9.5 Application for a 21.305(e) approval should be made by the original equipment manufacturer or the operator wishing to use the equipment. The applicant must have access to the technical data that supports the requirements set out in this AC or equivalent means.
- 2.1.9.6 In all cases, applications should be supported with complete and detailed technical data that will allow CASA to find compliance against the guidance of this AC. To find compliance, CASA will have to confirm the appliance or part meets the design requirements of an acceptable standard, be manufactured under a quality system that assures the item meets the design requirements and can be inspected and maintained during its life to assure the item continues to meet the design requirements.
- 2.1.9.7 Other methods of showing compliance will be considered, however there must be clear equivalence shown to the methods and requirements set out in this AC.
- 2.1.9.8 Applications for equipment approved as part of the aircraft design will typically follow a Supplemental Type Certification process and an application should be made as appropriate for the methods chosen.

2.2 Frequently asked questions (FAQ)

- 2.2.1 The following FAQ are intended as a quick reference to common questions.

2.2.2 How can I determine if my equipment meets the requirements of Part 21 right now?

- 2.2.2.1 All equipment used for the purposes of the carriage of persons external to the aircraft must be compliant with the requirements of, or approved under, Part 21. This means that everything that attaches to the hook system must have a specific CASA approval or acceptable foreign NAA equivalent. Verification that the equipment has been delivered with an ARC would initially assist in this determination.
- 2.2.2.2 While it has always been a requirement for equipment to be approved in this manner, equipment approvals prior to the publishing of Parts 91, 133 and 133 may have been issued and approved under Part 21 subpart M (typically through an Engineering Order or EO). Although this is an approval under Part 21, this does not comply with the requirements of Part 21 for the approval of appliances, part or materials which is undertaken under subparts 21.K and 21.O of the CASR.
- 2.2.2.3 A technical review of existing equipment should be undertaken to confirm the approval has been made under one of the pathways explained in this AC. A design engineering organisation will be able to assist with this technical review should an operator not have the technical expertise required for this task.

2.2.3 Can I get the equipment approved as part of a modification under a Supplemental Type Certificate (STC)?

- 2.2.3.1 If the equipment is attached permanently to the aircraft and becomes part of the aircraft approved design through modification, then the modification parts will typically be manufactured under an Australian Parts Manufacturer Approval (APMA). The APMA provides the manufacture approval of the appliance or part, and it will be issued with an ARC. In this scenario, the STC is approving the design and installation of the item as part of the approved modification.
- 2.2.3.2 In all cases, any new appliance or part must be approved by CASA under Subpart 21.K or 21.O, only then can an STC or Subpart 21.M approval incorporate the items into the modification approval.

2.2.4 Do I need an installation approval for my CASA approved appliance?

- 2.2.4.1 An "installation approval" implies the appliance or part needs to form part of the approved aircraft design. If so, an approved modification from the manufacturer or through an STC or 21.M approval would be required. This normally applies to the aircraft systems such as the hoist system.
- 2.2.4.2 If the appliance is attached to the hoist system but is not part of the aircraft, such as a litter system or body harness, then a compatibility assessment must be undertaken, but no installation approval is required. The equipment must be approved, for example under the Part 21 MOS or subregulation 21.305 (e) and the Aircraft Flight Manual should clearly state that the aircraft, hoist and attaching means is approved for HEC operations.

2.2.5 What are my options if equipment I want to use has been certified to a standard that does not appear in the Part 21 MOS?

- 2.2.5.1 CASA can approve equipment that is certified to a standard that is not in the Part 21 MOS, if upon application CASA determines the proposed standard meets the minimum safety criteria and the certification body is acceptable to perform and monitor the certification activity. The approval would be provided using CASR 21.305(e).
- 2.2.5.2 The standards identified in Section 3 of this AC have been deemed acceptable to CASA, but do not yet appear in the Part 21 MOS and would therefore be eligible for approval under Part 21.
- 2.2.5.3 Manufacturers or engineering organisations with unique or novel designs are encouraged to propose bespoke standards, based on existing standards or established practices for CASA consideration. Any proposal will have to meet all safety criteria, including the establishment of the structural capability and personnel safety features essential for external occupant safety.

2.2.6 Do I need an Authorised Release Certificate for my equipment ?

- 2.2.6.1 An ARC is not required for the purposes of attaching the equipment to the aircraft. However, if the equipment is approved under Part 21 and includes a CASA production authorisation, then an ARC will be issued with the product and should be retained by the operator as evidence that the equipment is approved for use under Part 21.

2.2.7 Who is responsible for the equipment design following approval?

- 2.2.7.1 Where the equipment is approved through the Part 21 MOS, the ongoing certification that underpins the approval will need to be monitored by the operator. This will require the operators to keep themselves informed of the integrity of the products through awareness of product recalls or cancellation of the product by the relevant certifying authority.
- 2.2.7.2 Where an approval under subregulation 21.305 (e) includes a production authorisation, the holder of the approval becomes responsible and will be subject to CASA oversight activities in the same manner as any other CASA production authorisation holder.

3 Equipment approvals under Part 21

In most cases, equipment attached to an existing approved aircraft system, such as hoist, belly hook, and is used for the purposes of HEC will not form part of the aircraft approved design. The operational rules of Part 91, 133 and 138 provide requirements for what equipment must be approved.

There is a notable exception for a personnel carrying device system (PCDS) where the airworthiness standards (27.865 and 29.865) require the equipment to be approved.

In both above cases, the requirement to be approved is a general reference to any acceptable means of approval. A rescue harness approved and marked with ATSO-C1003 (Helicopter external personnel lifting devices) would be such an approval.

Compatibility with the aircraft system would need to be assessed by the operator and when used in conjunction with an approved hoist system, no further legislative approvals would be required for the equipment.

The operator's approved exposition (Part 133) or Operations Manual (Part 138) must reflect the procedures for managing the equipment, including but not limited to how maintenance requirements and any retirement lives will be managed.

The rotorcraft flight manual (RFM) must also be assessed to assure there are no conflicts, otherwise a Flight Manual Supplement will be required.

3.1 Assessment criteria

- 3.1.1 There are two essential elements to be considered when assessing an item of equipment for Part 21 approval:
1. the ability to assess the design against an appropriate standard, and
 2. consideration of the manufacturers' quality system to repeatedly produce items against the approved specifications of the design.
- 3.1.2 Typically, equipment used for the purposes of air operations is either certified as part of the approved design (e.g. Type Certificate or Supplemental Type Certificate) or through minimum performance standards (MPS) published in Australian Technical Standard Orders and authorised under Subpart 21.O. TSO and ETSO issued by FAA and EASA respectively are also acceptable minimum performance standards.
- 3.1.3 In both instances, the design is assessed and approved against an accepted standard and the equipment is manufactured under a CASA Production authorisation, or in the case of an ATSOA, the quality system is validated, and production is approved in accordance with that quality system.

An appliance can only be approved under Part 21 if there is an acceptable standard to validate the design. In cases where a suitable standard is not published or readily available, an applicant can propose minimum performance standards to meet the needs of the equipment. Any proposed standard must be substantiated with quantitative and/or qualitative data that establishes an acceptable level of safety.

Additionally, an appliance cannot be approved if the method of production cannot demonstrate the capability to repeatedly produce items against the approved specifications of the design.

An appliance that cannot be assessed against a standard, or that cannot demonstrate production capabilities is not necessarily unsafe, it just cannot be approved under Part 21 as required by the operational regulations.

- 3.1.4 ATSO Authorisations (ATSOA) include the ability to deviate from the MPS under CASR 21.609 where the differences are compensated for by factors or design features providing an equivalent level of safety. Any deviation is at CASA discretion and should be identified upon application.

3.2 Approval "In any other manner approved by CASA"

- 3.2.1 Where an MPS is not published for the equipment, CASA can assess a proposed MPS and if found acceptable, can approve the design and production activity in a similar manner to the ATSOA process using subregulation 21.305 (e). Appendix A of this AC provides an MPS for a litter system that includes the rigid structure and the restraint system. In this example, there are existing published MPS for a general rigid litter (without restraint), and standards that cover systems of restraint and lifting hardware. However, when referred in isolation, these standards do not appropriately address the requirements of 27/29.865 mentioned in section 2.1.7.4 for the "personnel safety features essential for external occupant safety".
- 3.2.2 By combining the relevant MPS of relevant existing standards, a case for compliance against the applicable airworthiness standards can be made. In the case of Appendix A - Litter systems, this standard can be used to apply for an approval of a litter system under subregulation 21.305 (e). An application under this method includes a design and production authorisation. The ability to deviate from the MPS is also available, on the condition that the differences are compensated for by factors or design features providing an equivalent level of safety as per the ATSO process.
- 3.2.3 It is anticipated that Appendix A of this AC will transition to be published as an ATSO in the Part 21 MOS at the next revision. Should any other proposed MPS be accepted by CASA for the purposes of approval of equipment at any time in the future, then that MPS may become a candidate for being added to the MOS at the next revision.

3.3 Acceptable standards

- 3.3.1 Section 3.1 discusses how an appliance cannot be approved under Part 21 unless there is an accepted standard identified to validate the design and the method of production demonstrates the capability to repeatedly produce the appliance against the approved specifications of the design. The aviation system has used this fundamental approach for generations, leading the way in how to assure products and appliances perform as expected with a high degree of reliability.
- 3.3.2 In recent times, sectors outside of aviation have adopted a similar approach to production, allowing CASA to consider items for approval that are produced under equivalent systems and can demonstrably show equivalent levels of rigour in the approval process.
- 3.3.3 Appliances that are certified by a reputable organisation to an acceptable standard are eligible for approval by CASA through a subregulation 21.305 (e) approval or through prescription in the Part 21 MOS.
- 3.3.4 Certified products will need to demonstrate a design approval, a manufacturing authorisation and continuing oversight activities to be eligible.
- 3.3.5 It should be noted that manufacturer claims of compliance or equivalence are not acceptable. Terms such as "meets the requirements of" or "manufactured to" typically do not reflect a certified product.

3.4 European standards (EN)

- 3.4.1 The European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC) combine to develop and implement technical

standards primarily for the European market. Technical committees are formed to develop a range of standards across a diverse range of industries.

- 3.4.2 For a product to be certified in the European system, it must first be issued with a valid European (EU) Type Examination Certificate by a notified body. A notified body is designated by a European country to perform the conformity procedures on products and organisations that seek certification. A list of notified bodies is published by the European commission and the bodies themselves are subject to competence verification by accreditation organisations.
- 3.4.3 A European (EU) Type Examination Certificate is analogous to a Type Certificate issued in the aviation system.
- 3.4.4 Once a product receives a Type Examination Certificate, the manufacturer will start production of the items and issue a Certificate of Conformance, attesting the product has been manufactured in accordance with the conditions of the issue of the Type Examination Certificate. The Certificate of Conformance is analogous to CASA Form 1 in the Australian aviation system and both are considered to meet the definition of an ARC for the purposes of this AC.
- 3.4.5 The notified body that issued the Type Examination Certificate will perform ongoing oversight of the manufacturer to assure the certificate holder continues to attain the standard.
- 3.4.6 Table 1 provides a non-exhaustive list of EU standards that are considered acceptable and therefore eligible for approval by CASA under subregulation 21.305 (e). The listed standards are developed by the European Committee for Standardisation (CEN) Technical Committee CEN/TC 160 - Protection against falls from height including working belts.
- 3.4.7 In some cases, such standards as EN 12277 Mountaineering equipment - Harnesses, have been omitted from the list as the equipment is primarily designed for sporting activities and developed by the technical committee CEN/TC 136 - Sports, playground and other recreational equipment. In this example, the static testing of the equipment is equivalent to the standards listed in Table 8, but there is no dynamic test which requires, amongst other things, the body to come to rest in a vertical position. Standards that are not included in Table 8 may still be eligible for approval, but an applicant would need to justify why the available alternatives are not suitable.

Table 8: European Standards

Standard	Title
EN 354:2010	Personal protective equipment for work positioning and prevention of falls from a height — lanyards
EN 355:2002	Personal protective equipment against falls from a height — energy absorbers
EN 358:2018	Personal protective equipment for work positioning and prevention of falls from a height — belts for work positioning and restraint and work positioning lanyards
EN 361:2002	Personal protective equipment against falls from a height — full body harnesses
EN 362:2004	Personal protective equipment against falls from a height — connectors
EN 363:2018	Personal fall protection equipment — personal fall-protection systems
EN 364:1992/AC:1993	Personal protective equipment against falls from a height — test methods

Standard	Title
EN 365:2004/AC:2006	Marking/packaging/instructions to use
EN 813:2008	Personal fall-protection equipment — sit harnesses
EN 1497:2007	Personal protective equipment against falls from a height — rescue harnesses
EN 1498:2008	Personal protective equipment against falls from a height — rescue loops
EN 1891:1998	Personal protective equipment for the prevention of falls from a height — low stretch kernmantle ropes

3.5 National Fire Protection Agency (NFPA)

- 3.5.1 The National Fire Protection Agency (NFPA) Standard 1983 - Standard on Life Safety Rope and Equipment for Emergency Services provides standards for many types of equipment, such as full body harnesses, ropes, litters, and carabineers. Similar to the European Standards described in section 3.2.6, NFPA 1983 is developed by the Special Operations and Fire and Emergency Services Protective Clothing and Equipment technical committee.
- 3.5.2 The independent validation of products certified to NFPA 1983 is undertaken by third parties such as UL Solutions ². The general approach is like the European model in that the product design, manufacturing, and continuing oversight forms part of the certification. However, in the case of UL, a product and manufacturer are 'listed' in lieu of a 'Type Certificate' such as the Type Examination Certificate issued in Europe. Listing through the UL website allows for confirmation that any given product has a valid certification. Any products that fail to consistently meet the standards are removed from the listing.
- 3.5.3 A Certificate of Conformance is still issued by the manufacturer for the product attesting to compliance with the standard.
- 3.5.4 Table 9 provides a non-exhaustive list of NFPA standards that are considered acceptable and therefore eligible for approval by CASA under 21.305(e). As with the European system, any standards that are not included in Table 9 may still be eligible for approval.

Table 9: National Fire Protection Agency (NFPA) standards

Standard	Title
NFPA 1983	Standard on Life Safety Rope and Equipment for Emergency Services
	Life Safety Harness - Class III
	Victim Extrication Device - Class III
	Carabiner – (G) General Use (technical use equipment is explicitly excluded from this table)

² Formerly Underwriters Laboratories.

Example:

Part 133 MOS Chapter 5, Division 1 provides for external load operations conducted during medical transport operations. Section 5.06 specifically requires the external load equipment, fittings, lines, safety harnesses, restraint straps and rescue harnesses to meet the requirements of, or be approved under, Part 21 of CASR.

An operator has selected a full body harness that has been manufactured and certified to EN 361:2002 - 'Personal protective equipment against falls from a height — full body harnesses'.

Review of the flight manual for compatibility states the following: 'Operation of the external hoist equipment with HEC requires the use of a Personnel Carrying Device System (PCDS), which must be approved by the Local Aviation Authority. TSO-C167 provides one acceptable means of approval for such systems.'

At the time of review, the MOS does not state acceptance of the EN standard for body harnesses. However the standard is identified as acceptable in this AC, so an application to CASA for a 21.305(e) approval can be made with sufficient supporting data. In this example, sufficient data would be the active Type Examination Certificate, an example Certificate of Conformance of the product and the flight manual extract that shows compatibility with the aircraft system.

Assuming the application is complete, the harness will be approved by CASA without further showing. The Part 133 exposition (for this example) will be updated to reflect the management procedures for use, maintenance and retirement of the equipment.

3.6 Alternative standards

- 3.6.1 The standards identified above in sections 3.4.7 and 3.5.4 have been reviewed and are provided as examples of the type of system and standard that would be acceptable to CASA for an approval. The tables are not exhaustive, and many standards will be eligible for approval if the criteria laid out in this AC are adhered to.
- 3.6.2 The Part 21 MOS may be updated from time to time. Where appropriate, standards that are acceptable to CASA will be listed, thereby satisfying the requirement to be approved under Part 21 without further CASA approval if a system of product certification that meets the criteria is evident.

4 Operational implementation

Approved equipment does not automatically qualify for use in an aircraft operation. The Part 21 approval of equipment confirms the appliance is expected to perform within its' design specifications and to a level of durability for the conditions for which it is designed.

The following paragraphs summarise some of the additional items that must be considered to use approved equipment.

4.1 Update to the approved Exposition (Part 133) or Operations Manual (Part 138)

- 4.1.1 Section 2.1.7.1 discusses how it is preferable that the equipment is approved in a manner where it does not form part of the aircraft approved design (i.e. through modification of the aircraft). In such cases, the continuing airworthiness programs for the aircraft do not consider the equipment, so important management functions such as configuration control, maintenance task scheduling, retirement life, etc must be controlled through operational procedures.
- 4.1.2 Prior to use of the equipment, the operational procedures must clearly establish how the equipment will be managed, including but not limited to serviceability inspections, maintenance methods, configuration control, supplier management, etc. The equipment documentation will inform the scope of the management functions. The operator's exposition (Part 133) or Operations Manual (Part 138) will need to be updated to reflect the management processes in relation to the equipment.

4.2 Aircraft compatibility

- 4.2.1 The RFM should be reviewed to verify the approved equipment is compatible. The RFM will typically detail what equipment may be used with the aircraft. In the case of a personnel carrying device system (PCDS), the flight manual may identify specific part numbers or may only broadly require that the equipment is approved by CASA (the NAA). The details may be provided in a flight manual supplement, particularly where the aircraft hoist system has been added to the airframe via modification post-production.
- 4.2.2 If compatibility cannot be clearly identified within the RFM, an approved supplement to the RFM will be required to alert the operating crew to what equipment has been deemed compatible for the operation and any associated limitations.

4.3 Risk mitigation

- 4.3.1 A safety analysis of the user function should be performed to assure personnel safety features that are essential for occupant safety are maintained. For example, dynamic rollout of the attachment hardware, trip hazard from lanyards, etc.

Note:

CASA has issued the following AWBs relating to helicopter personnel carrying operations:

- AWB 25-030 - Helicopter Personnel Winching - Human External Cargo (HEC) Operations Issue 1 dated 12 May 2015.
- AWB 25-033 - Helicopter Personnel Winching - Inadvertent Disconnect Issue 1 dated 09 July 2018.

- 4.3.2 In the case of restraint systems (where the crew member is restrained within the cabin):
- The user of the equipment should have the ability to disengage from the restraint system in the event of an emergency egress.
 - The system must restrict the travel of the crew member to assure the crew member cannot fall any distance from the aircraft.
 - The harness and lanyard combination (however described) must not be used to suspend or hold a body in tension.

4.4 Training

- 4.4.1 Consideration should be given to the training requirements for any person associated with the use of the equipment. The training should consider the basic use of the equipment, as informed by the manufacturer's documentation, but also consider the supply, usage, handling, and storage.
- 4.4.2 Persons tasked with performing maintenance actions such as visual inspections should show competence in understanding and identifying unacceptable features of the equipment and the procedures used to manage such findings (i.e. discard, return to approved repairer, etc).

4.5 Conditions

- 4.5.1 The following are typical conditions that can be expected to be in place for approved equipment. However, these are provided as examples and are non-binding, only conditions stated in the specific approval will apply.
- The mass (weight) limits must be established for each item of equipment. Nominally, textile harnesses and restraint straps are limited to a specific mass, or the manufacturer's declared maximum limit, whichever is the lowest.
 - The total mass is inclusive of clothing, tooling and any other ancillary equipment (i.e. medical equipment).
 - All equipment must be limited to a maximum service life established by the manufacturer or stipulated in the reference standard.
 - All attaching hardware must be certified, either by inclusion with the equipment certification or be individually certified.
 - Only the certified attachment points of the equipment may be used (per the manufacturer's instructions). Auxiliary attachments on the equipment must not be used for the primary load path.
 - Where applicable, the operator is required to keep on record the applicable Certificate of Conformance for all products that are used.
 - The equipment must be maintained in accordance with the manufacturer's instructions and in line with the operator's exposition or operations manual.
 - Any safety alert or similar direction issued by the original manufacturer must be adhered to.
 - Certified metallic items such as connectors must have a manufacturer declared minimum strength of 40kN or greater. Where applicable, this rating is for the gate closed and on the major axis.

- Any required calculations for a working load limit (WLL) must assume a minimum Safety Factor of 7.
- Any defects or service issues identified with the equipment must be reported to the equipment manufacturer in the first instance. A report must also be made to CASA through the CASA Defect Reporting Service. CASA Advisory Circular AC 20-06 provides guidance on this matter.

5 Equipment approval pathways under Part 21

Equipment used for the purposes of HEC falls under the category of an appliance when referring to the CASR dictionary. Appliances are approved under subparts 21.K (approval of materials, parts, processes, and appliances) and subpart 21.O (Australian Technical Standard Order Authorisations).

Appliances cannot be approved under subpart 21.M as that subpart deals with the design of modifications and repairs.

The primary function of equipment approval is to assure the product will perform to its intended design. What may be suitable for one kind of operation, may not be suitable for another. All equipment must be fit for purpose.

The following sections expand on the methods that may be used for the approval of equipment under Part 21.

5.1 Australian Parts manufacturer Approval (APMA) - Regulation 21.305(a)

- 5.1.1 An APMA is a replacement or modification part. Although included here for completeness, an APMA pathway is unlikely to be the preferred method of approval as an APMA is typically replacing an existing part or being used to modify an existing aircraft system. Introducing a new item of equipment for use with an existing aircraft system is not considered a modification to the aircraft.
- 5.1.2 An APMA would be appropriate for a structure that is permanently attached to the aircraft such as a powerline inspection platform.
- 5.1.3 CASA AC 21-27 - 'Manufacturing approval - overview' and AC 21-16 - Approval of materials, parts, processes and appliances provide further detail on AMPA approvals.

5.2 Australian Technical Standard Order Authorisation - Regulation 21.305(b)

- 5.2.1 An Australian Technical Standard Order Authorisation (ATSOA) is an authorisation to manufacture an article to a design that has been found to meet the requirements of a TSO, ETSO or ATSO.
- 5.2.2 A TSO, ETSO or ATSO contains the minimum performance standards (MPS) for an article and may include requirements for a technical design standard, the need for technical data to be produced (including operating instructions and limitations), and the requirement for part marking and supply.
- 5.2.3 CASA Advisory Circular AC 21-601 - Australian Technical Standard Order Authorisation provides guidance on aspects of ATSOA.
- 5.2.4 CASA publishes ATSOs in the Part 21 MOS. Current ATSOs relating to external loads are:
 - ATSO-C1001 – Dispatcher's restraint strap
 - ATSO-C1003 – Helicopter external personnel lifting devices.
- 5.2.5 An example TSO published by the FAA in relation to external loads is:

TSO-167 - Personnel Carrying Device Systems (PCDS), also known as Human Harnesses.

- 5.2.6 An ATSOA does not confer installation authority, however as previously stated, the equipment used for HEC does not form part of the approved design. Compatibility of the equipment with the aircraft system is defined in the Aircraft (Rotorcraft) Flight Manual and the approved operations exposition or operations manual.
- 5.2.7 The above statement only applies when the approved equipment such as a full body harness or rescue stop does not form part of the type design. In other cases where the equipment is installed into the aircraft and is an effective modification, the installation of an article manufactured under an ATSOA must be approved separately in a manner acceptable to CASA; for example, under a design approval pursuant to Subpart 21.M, an STC or a TC.
- 5.2.8 For products that are manufactured to a TSO or ETSO by a foreign state, refer to section 5.5 - Approval of imported materials, parts and appliances - Regulation 21.305(d).

Note: Appendix A of this AC provides an acceptable standard for litter systems and is expected to be transitioned to an ATSO in the Part 21 Manual of Standards in the future.

5.3 Type Certificate procedures - Regulation 21.305(c)

- 5.3.1 Type certification procedures are typically utilised for the production of the aircraft external cargo system (e.g. hoist) which forms parts of the aircraft approved design from production. The use of a PCDS such as a full body harness would not typically be approved as part of the aircraft type design, hence the harness should be approved by one of the other methods identified in this section.
- 5.3.2 The equipment that may be used with the approved aircraft system is usually identified in the RFM along with the approval of the aircraft to perform Human External Cargo Operations.
- 5.3.3 When a Supplemental Type Certificate (STC) process is used to modify an aircraft, the modification parts are usually manufactured under an APMA (21.305(a)) or produced under an ATSOA (21.305(b)). The other methods of this section may also be used to approve the equipment depending on the circumstance, but in all cases, the STC can only approve the design and installation, the STC cannot authorise the production of any item.

5.4 Approval of imported materials, parts and appliances - Regulation 21.305(d)

- 5.4.1 Regulation 21.305(d) provides for approvals of imported materials, parts and appliances under Subpart 21.N. Within that Subpart, regulation 21.502 provides the requirements for the approval of imported equipment from recognised countries and foreign states that have an agreement with CASA to accept such items.
- 5.4.2 A harness manufactured to FAA TSO C167 is an example of approved equipment under provision 21.305(d).
- 5.4.3 Regulation 21.502A provides for approval of equipment that is not from a recognised country, however the applicant must, on request, provide any technical data for the design of the material, part or appliance and meet the requirements prescribed by the Part 21 MOS.

- 5.4.4 Regulation 21.305(d) is very similar to 21.305(da) below due to the need for the manual of standards to prescribe requirements. It is therefore unlikely to be used for approval in lieu of the other pathways mentioned below.

5.5 Approval in a manner prescribed by Part 21 MOS - Regulation 21.305(da)

- 5.5.1 Regulation 21.305(da) provides for an article to be approved in a manner prescribed by the Part 21 MOS. Several ATSOs are currently published in the MOS, and these are to be used in conjunction with an ATSOA (as described above).
- 5.5.2 The MOS may prescribe alternate specifications that have been assessed by CASA and deemed acceptable for use however there are currently no other specifications prescribed for this pathway other than ATSOs. CASA may consider alternate standards/specifications for inclusion and add them to the MOS from time to time.
- 5.5.3 Section 3 of this AC discusses currently issued standards that may be acceptable to CASA and could be added to future revisions of the Part 21 MOS.

5.6 Approval in any other manner approved by CASA - Regulation 21.305(e)

- 5.6.1 Regulation 21.305(e) may be used by exception when the other pathways identified in regulation 21.305 are not appropriate.
- 5.6.2 An approval provided under regulation 21.305(e) is issued through an instrument that will set out the manner approved by CASA. The instrument can stipulate the accepted Performance Standards, the manufacturing quality system, the continuing airworthiness requirements for the product and any other condition that CASA deems necessary to establish a minimum acceptable level of safety.
- 5.6.3 An approval under 21.305(e) may involve a design and production authorisation and the ability to issue an ARC.
- 5.6.4 Where equipment is certified to a published standard that is found to be acceptable to CASA and not published in the Part 21 MOS, the equipment may be simply approved without an approval holder being identified.
- 5.6.5 When this is the case, the holder of the approval will be subject to CASA oversight activities in the same manner as any other CASA production authorisation holder.
- 5.6.6 In the absence of a suitable, published ATSO, TSO or ETSO (and therefore the inability to receive an ATSOA), regulation 21.305(e) provides that CASA may approve a material, part, process, or appliance in any manner approved by CASA.
- 5.6.7 If an application for equipment approval has been submitted to CASA and aligns with the relevant paragraphs of section 3.3 of this AC, CASA may approve an appliance under regulation 21.305(e). Section 3 of this document discusses currently issued standards that may be acceptable to CASA.
- 5.6.8 It should be noted that any approval provided using regulation 21.305(e) would be valid within Australia only and would typically not be accepted internationally, for example as part of the US bi-lateral agreement on the acceptance of manufactured parts.
- 5.6.9 An application for a 21.305(e) approval should be made using CASA Form 849.

Appendix A

Rescue litter system

A.1 Application

This Appendix applies to a rescue litter system when used as part of a personnel carrying device system (PCDS) manufactured for the purposes of human external cargo (HEC) operations. The complete litter system consists of the:

- rescue litter or stretcher used to carry a person external to the aircraft
- restraint system that retains the occupant in the litter while external to the aircraft.

A.1 Definitions

Table 10: Definitions

Term	Definition
adjuster	Device which is not required to sustain a full force of a fall-arrest and which is used to fit and adjust webbing to a litter occupant.
AS/NZS 1891.1:2020	Australian/New Zealand Standard AS/NZS 1891.1:2020 - Personal equipment for work at height - Part 1: Manufacturing requirements for full body combination and lower body harnesses.
attachment point	Point on a litter for connecting to a lifting bridle or similar device.
basket type litter	A conveyance for the sick or injured usually consisting of a tubular metal frame enclosing a moulded plastic or wire shell. Also known as a basket stretcher. (ASTM)
human external cargo (HEC)	A person(s) that at some point in the operation is carried external to the rotorcraft.
litter bridle	A manufactured or improvised system that attaches the litter to the raising or lowering system.
personnel carrying device system (PCDS)	A device or system that has the structural capability and features needed to safely transport occupants external to the rotorcraft during HEC operations. A PCDS includes, but is not limited to, life safety harnesses, and rigid baskets or cages either attached to a hoist or cargo hook or mounted to the rotorcraft airframe (see TSO C167).
product label	A label or marking affixed to a product by the manufacturer that provides general information, warnings, instructions for care, maintenance, and other information.
rescue litter system	An apparatus, also called a stretcher, designed to secure, protect and transport a patient horizontally during Human External Cargo (HEC) operations. The system includes the basket type litter and the restraint system as an assembly.
restraint hardware	Any component of the restraint system that is not part of the webbing.
restraint system assembly	Each item of the restraint system that retains a person in the litter. This includes belts, harnesses, webbing, buckles, etc.

A.2 Minimum performance standards – Rescue litter

A.2.1 Litter design requirements

- A.2.1.1 Litters shall not be designed or constructed in a manner that allows for self-destructive action. For example, single weld failures leading to structural failure.
- A.2.1.2 Litters designed to split apart shall have an integral connection system.
- A.2.1.3 Litters designed for use in water retrievals shall provide buoyancy such that the mouth and nose of a completely relaxed person are kept above the water line.

A.2.2 Materials – general

- A.2.2.1 All materials selected for the design shall be entirely suitable for the purpose intended, including giving due consideration to strength, durability and all possible environmental conditions that may be encountered.
- A.2.2.2 Metallic parts shall be made of corrosion resistant material, or they shall be suitability protected against corrosion.
- A.2.2.3 All metals shall conform to the chemical requirements of the applicable specifications for the grade(s) selected.
- A.2.2.4 All materials shall be finished smooth, with no voids, discontinuities, damage or features that may affect the integrity of the litter.

A.2.3 Frame – welded

- A.2.3.1 All joints and intersections of the frame, ribs and basket rim shall be welded by competent persons to American Welding Society AWS D17.1:2024 – Specification for Fusion Welding for Aerospace Applications.
- A.2.3.2 All welds shall be visually inspected; acceptable welds shall not exhibit any cracks or voids with complete fusion between the weld layers and base metal.
- A.2.3.3 All projections, loose weld spatter or other defects that may cause injury to patient or handler shall be removed.
- A.2.3.4 Following welding, the litter shall be cleaned by an appropriate mechanical or chemical process, however grinding is prohibited as this may weaken the structural element.

A.2.4 Rigidity

- A.2.4.1 The frame shall not show permanent deformation of the top rail or evidence of sag, bow, distortion or strain in any part of the main structural elements when tested in accordance with the procedure identified in section Testing (A.2.6.1)

A.2.5 Workmanship

- A.2.5.1 The finished article shall be free from sharp or rough edges and shall be free from defects. Any tools used in the fabrication of the litter shall be free of dust contaminants or other artefacts that may impair the serviceability of the article.

A.2.6 Testing

- A.2.6.1 Testing of the litter shall be conducted in accordance with ASTM International F2821 - Standard Test Methods for Basket Type Rescue Litters.

- A.2.6.2 The litter must meet or exceed the test requirements for horizontal lift for structural failure under load and permanent deformation of the top rail or the main structural elements.

A.3 Minimum performance standards – Restraint system

A.3.1 Webbing and thread

- A.3.1.1 All components of the restraint system which are in contact with the body shall be made from webbing or material equivalent to webbing in respect of strength, durability and load transfer characteristics.
- A.3.1.2 All webbing and thread used for the restraint system shall be considered as load-bearing material.
- A.3.1.3 Webbing and thread should conform to section 2.2 of Australian/New Zealand Standard AS/NZS 1891.1:2020 - Personal equipment for work at height - Part 1: Manufacturing requirements for full body combination and lower body harnesses.
- A.3.1.4 Threads used for sewing shall be physically compatible with the webbing material and should be manufactured from high tenacity synthetic fibre, having a melting point and chemical resistance that is equivalent to or superior to the material being sewn.
- A.3.1.5 The thread shall be of contrasting shade to facilitate visual inspection.
- A.3.1.6 Holes, rivets or eyelets shall not be used in webbing.

A.3.2 Restraint hardware

- A.3.2.1 All hardware of the restraint system shall be as follows:
- Designed and tested (i.e. type tested and routine tested as appropriate) to meet the applicable strength requirements for their application as specified in AS/NZS 1891.1:2020 clauses 2.3.3 to 2.3.5 (where applicable)
 - Free from any material or manufacturing defects.
 - Designed to minimize damage to webbing.
 - Protected from corrosion in accordance with Clause 2.3.2 of AS/NZS 1891.1:2020.
- A.3.2.2 The buckle shall not be susceptible to inadvertent release or be opened through a single action. Buckles of the restraint system should require a dual action such as a simultaneous depressing by use of the thumb and index finger.
- A.3.2.3 Any 'D' ring or 'O' ring used as part of the restraint system shall have a minimum capacity of 22 kN.
- A.3.2.4 Products being used to perform the same function as a D ring or O ring, manufactured from rigid material other than metal, shall meet the same requirements specified in AS/NZS 1891.1:2020 clauses 2.3.1, 2.3.2 and 2.3.4.

A.4 Minimum performance standards - General

A.4.1 Testing

Rescue Litter

- A.4.1.1 Testing of the litter shall be conducted in accordance with ASTM International F2821 - Standard Test Methods for Basket Type Rescue Litters.
- A.4.1.2 The litter must meet or exceed the test requirements for horizontal lift for structural failure under load and permanent deformation of the top rail or the main structural elements.

Restraint system

- A.4.1.3 Webbing shall be tested in accordance with section 2.2.3 Performance requirements of AS/NZS 1891.1:2020.
- A.4.1.4 The webbing shall be tested in accordance with Appendix A for resistance to degradation by either artificial light or daylight.
- A.4.1.5 When tested in accordance with Appendix A the minimum breaking strength of the three exposed samples shall be at least 70 % of the mean of the breaking strength of the three unexposed samples.
- A.4.1.6 Testing of 'D' rings and 'O' rings shall be in accordance with ANSI/ASSP Z359.12.

A.4.2 Labelling

Rescue Litter

- A.4.2.1 Each litter shall have a product label stamped, engraved, or otherwise permanently marked with the following information:
- Manufacturer's name, trade name or trademark.
 - Country of manufacture
 - Serial number.
 - Model and type/Identification.
 - The month and year of manufacture.
- A.4.2.2 All letters shall be at least 2 mm (5/64 in.) high.
- A.4.2.3 Multi-label pieces shall be permitted to carry all statements and information required to be on the product label, however, all label pieces comprising the entire product label shall be located adjacent to each other.

Restraint system

- A.4.2.4 Each restraint system assembly shall be clearly and permanently labelled with the following information:
- Manufacturer's name, trade name or trademark.
 - Serial number.
 - Model and type/Identification.
 - Standard number and year to which it conforms.
 - The month and year of manufacture.

Note: Facility may be provided for user marking of an 'in service' date.

- The month and year to remove from service which shall be no more than 10 years from the date of manufacture.

A.4.2.5 Readability:

- Labelling shall be legible and readable, enabling the user to clearly distinguish individual letters or characters from each other.
- The labelling shall be designed to be clearly legible throughout the life of the product under normal usage conditions.

A.4.3 User information

A.4.3.1 The manufacturer of the litter assembly system shall furnish the purchaser with information that addresses the following:

- inspecting the litter assembly periodically according to the manufacturer's inspection procedure
- removing the litter assembly from service if the equipment does not pass inspection or if there is any doubt about the safety or serviceability of the equipment
- maintaining the litter assembly in accordance with the manufacturer's instructions where metal components are subjected to corrosion or deterioration
- returning the litter assembly to the manufacturer or to a qualified inspection person/centre if the equipment is dropped or impact-loaded
- repairing the litter assembly only in accordance with the manufacturer's instructions.

A.4.3.2 The manufacturer of the litter assembly shall furnish the purchaser with a sample of suggested records to be maintained by the purchaser or user of the litter and a list of items that the records need to contain.