

Certification of Liquid Penetrant Inspections

Response received from CASA on 2 November 2023 to the following questions raised on 25 July 2023.

- *There is a conflict between the Part 66 privileges for a B1 LAME with respect to Liquid Penetrant Inspections and the Part 145 AMC and the AC66-08 regarding the carrying out of fluorescent penetrant inspections. There is also some conflict between AW 002-20 and CAO 108.10 regarding the use of colour contrast penetrant inspections.*
- *What authorisations are required to be held before a person can perform and certify Fluoro Penetrant Inspections in a Part 145 or CAR 30?*

In response to questions you have raised recently please see below:

Question 1: *There is a conflict between the Part 66 privileges for a B1 LAME with respect to Liquid Penetrant Inspections and the Part 145 AMC and the AC66-08 regarding the carrying out of fluorescent penetrant inspections. There is also some conflict between AW 002-20 and CAO 108.10 regarding the use of colour contrast penetrant inspections.*

Answer:

Thank you for bringing this inconsistency to CASA's attention. CASA acknowledges there is an inconsistency of language used to describe this licence privilege from one document to the other.

CASA will undertake a review to ensure clarity and consistency of information provided across the suite of documents.

Background: Regarding the apparent conflict that exists between the NDT inspection privileges expressed in the [Part 66 Manual of Standards](#) (MOS) for a Part 66 Category B1 LAME with respect to Liquid Penetrant Inspections (LPI), compared to what information is expressed in the Part 145 AMC and the AC66-08:

This privilege was provided under the previous CAR 31 licensing system in paragraph 2.2 of Appendix 1 – *Airframe category privileges*, of [Civil Aviation Order 100.90 - Administration and Procedure - Aircraft Maintenance Engineer Licences - General Requirements](#) (CAO 100.90) – (see extract below):

2.2 Airframes Category Privileges: With respect to maintenance of aircraft, certification of maintenance within the airframe category may be made by persons holding the appropriate airframe rating(s), with the following limitations:

(a) inspections using an NDT method — limited to liquid penetrant inspections utilising aerosol packed materials.

It is apparent, the words “— limited to liquid penetrant inspections using aerosol packed materials” has previously been interpreted to mean both colour contrast (red) dye penetrant and fluorescent dye penetrant, given (I am aware) that fluorescent dye is available in an aerosol application.

Additional Information Only: Please note that Wikipedia references are not normally included as official or authoritative sources of information. However, they have been used in this instance because most of the other official NDT standards require payment. The Wikipedia references are for general information purposes only.

NDT liquid penetrant inspections (LPI) or penetrant inspections (PT), as this NDT method is referred to in Australian Standard AS3669, primarily comprise of two penetrant solutions:

- Type I - fluorescent penetrant (visible under ultraviolet light (black light)), and https://en.wikipedia.org/wiki/Fluorescent_penetrant_inspection
- Type II - dye penetrant (visible under ordinary white light). https://en.wikipedia.org/wiki/Dye_penetrant_inspection

Which in turn, are commonly referred to as:

- Fluorescent Penetrant Inspections (FPI), and
- Dye Penetrant inspections (DP).

Both are a type of LPI (or PT) inspection. <https://www.bindt.org/What-is-NDT/Liquid-penetrant-inspection/>

Type I – fluorescent (FPI) inspection requires training and authorisation of the person carrying out the inspection in the NDT method and correct use of the black light, which is additional to ‘basic knowledge training’ on NDT inspection techniques a B1 LAME covers under competency unit MEA 365 (reference: Appendix IV of the [Part 66 Manual of Standards](#) (MOS)).

Therefore, without additional training on the FPI method and correct use of the black light, **a B1 LAME does not have the privilege to do FPI inspections.**

Type II – Dye Penetrant (DP) Inspection is a B1 core privilege inferred by the Part 66 MOS under subparagraph 66.A.20 (a) 4. (ii) (H), and previously under paragraph 2.2 of CAO 100.90 (above) for CAR31 LAME’s.

It is apparent the wording of subparagraph 66.A.20 (a) 4.(II)(H) and CAO 100.90 has previously created confusion, as both generally mention liquid penetrant inspections under the privilege without clarifying the two types (Type I & Type II) of penetrant solutions that are commonly used for an LPI.

Current information – as presented in various documentation:

- **Part 66 MOS** — 66.A.20 (a) 4. (H) - inspection using an NDT method — but only if limited to liquid penetrant inspection using aerosol-packed materials.
- **MOS AMC 145.A.30 (f)** — Note: A non-destructive penetrant test using portable equipment means those processes and equipment covered by AQF Competency unit ‘MEA365 Assess structural repair/modification requirements and evaluate structural

repairs and modifications', being a pre-requisite competency unit for the grant of a Part 66 B1 Category Licence. The authorisation for a B1 Category Licence holder is limited by the extent of training covered under this unit of competency, which is the colour contrast dye penetrant inspection technique.

- [AC 66-08 v1.3](#) — subsection 3.4.3.6, see abbreviated extract below:

Additional category B1 maintenance privileges

3.4.3.6 Despite any exclusions listed on a licence, the holder of a category B1 licence endorsed with a subcategory may certify:

- inspections using an NDT Liquid Penetrant Inspection (LPI) method (limited to the visible colour contrast Type II dye penetrant technique — NOT the fluorescent dye penetrant, inspection technique).

Notes: (NDT inspections using the LPI method)

1. NDT inspections using the visible colour contrast LPI method, are not to be used for final inspection of safety critical components, and not to be used before an inspection using fluorescent penetrants.

References:

a. CASA Airworthiness Bulletin AWB 20-002 Use of visible (red) dye liquid penetrant with inspection of safety critical components, and

b. the American Society for Testing and Materials (ASTM), ASTM E 1417/E1417M-16 – Standard practice for liquid penetrant testing.

2. This NDT privilege does not include inspections using the Type I - fluorescent penetrant (visible under ultraviolet light) inspection technique.

3. This NDT privilege is consistent with airframe category and engine category NDT inspection privileges under the previous CAR 31 licensing system.

4. Under Appendix IV of the Part 66 MOS, licence category training for a category B1 licence delivers the competency to carry out LPI inspections using the visible colour contrast dye penetrant technique only (refer to competency unit MEA365).

Category B1 licence privilege

NDT inspection privileges for the Category B1 licence are expressed in the 66 MOS under 66.A.20 (a) 4. (H) and supported by the basic knowledge topics covered under sub-module 7.18 (c) and the MEA 365 unit of competency (UoC) (identified as a required UoC for the Category B1 licence, under Appendix IV of the 66 MOS).

In consideration of the above references, CASA confirms, **Category B1 licence privileges for NDT liquid penetrant inspections are limited to the Type II Dye penetrant (DP) inspection method only.**

Although:

- **the 66 MOS** refers to the privilege being limited to “liquid penetrant inspections (LPI) using aerosol-packed materials”, and
- **the Part 145 AMC** references a non-destructive penetrant test using portable equipment and processes covered by MEA365 (i.e., a colour-contrast dye penetrant inspection), and
- **the AC66-08** refers to inspections using LPI method limited to the visible colour contrast Type II dye penetrant technique,

all documents are referring to an NDT liquid penetrant inspection (LPI) method, using the **Type II Dye Penetrant (DP) inspection** technique.

Question 2: *What authorisations are required to be held before a person can perform and certify Fluoro Penetrant Inspections in a Part 145 or CAR 30?*

Answer 2: As per the below:

AMO — the AMO is required to provide specific training on this NDT inspection method to their LAMEs (under the control/oversight of a Level 3 qualified NDT person), prior to then issuing the LAME a specialist maintenance authorisation — authorising the LAME to certify for this type of NDT inspection.

CAR 30 — similarly, the CAR 30 is required to provide specific training on this NDT inspection method to their LAMEs (under the control/oversight of a Level 3 qualified NDT person). The CAR 30 would then seek for the LAME to be issued a CAR 33B Airworthiness Authority by CASA. This instrument may/may not have a condition on it that limits the holder’s NDT inspection privilege to this particular CAR 30 organisation.