



Proposed Framework for Implementation of Competency-based Approach to Dangerous Goods Training and Assessment in Hong Kong

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The Government of the Hong Kong Special Administrative Region

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Section 1 Introduction

1.1 Background

1.1.1 To ensure aviation safety, the International Civil Aviation Organization (ICAO) has developed a set of provisions governing the transport of dangerous goods (DG) by air. These provisions regulate matters such as the classification, packing, marking, labelling and loading of DG on board aircraft, and other matters such as training requirements for related aviation personnel. The detailed specifications are set out in the Technical Instructions for the Safe Transport of Dangerous Goods by Air (TI) which are updated and published by ICAO biennially.

1.1.2 The requirements of the TI are given legal effect through two pieces of local subsidiary legislation, viz –

(a) The Air Navigation (Dangerous Goods) Regulations (AN(DG)R) (Schedule 16 to the Air Navigation (Hong Kong) Order 1995 (Cap. 448C)); and

(b) Dangerous Goods (Consignment by Air) (Safety) Regulations (DG(CAS)R) (Cap. 384A) .

The former regulates the DG operation of aircraft and airport operators, whereas the latter regulates shippers and freight forwarders in respect of the proper handling of DG before offering them for air transport.

1.1.3 In accordance with the AN(DG)R and DG(CAS)R, employees of aircraft operators and their handling agents, security agents, shippers and freight forwarders are required to complete DG training programmes which are commensurate with the functions for which they are responsible as specified in the TI prior to performing any of their duties.

1.1.4 From 1 January 2021, Chapter 4 of Part 1 of the TI which specifies the DG training and assessment requirements has been revised from the current categorisation approach to a competency-based approach, and such revised training and assessment requirements shall become mandatory from 1 January 2023. Consequent upon this change, aircraft operators and their handling agents, security agents, shippers and freight forwarders shall review and update their DG training programmes as deemed necessary. Regardless of whether such training are provided within an organization or by a CAD approved third party training provider, employers need to ensure that training provided to employees after 1 January 2023 meet this new requirement. Training provided before 1 January 2023 that has a validity period covering beyond this date will continue to be valid until the next recurrent training cycle.

1.2 Purpose

1.2.1 This document sets out the proposed framework for implementation of competency-based training and assessment (CBTA) for aircraft operators and their handling agents,

security agents, shippers, freight forwarders and their subcontractors who have a role to play in ensuring the safe transport of DG by air in Hong Kong.

1.3 Glossary of Terms

1.3.1 The commonly used abbreviations related to the proposed framework for implementation of CBTA are listed below:

| Abbreviation | Description |
|----------------|---|
| AN(DG)R | The Air Navigation (Dangerous Goods) Regulations (Schedule 16 to the Air Navigation (Hong Kong) Order 1995 (Cap. 448C)) |
| DG(CAS)R | Dangerous Goods (Consignment by Air) (Safety) Regulations (Cap. 384A) |
| CBTA | Competency-based training and assessment |
| DG | Dangerous goods |
| DGR | Dangerous Goods Regulations |
| IATA | International Air Transport Association |
| ICAO | International Civil Aviation Organization |
| ICAO Doc 10147 | Guidance on a Competency-based approach to Dangerous Goods Training and Assessment published by ICAO |
| KSA | Knowledge, skills and attitudes |
| TI | Technical Instructions for the Safe Transport of Dangerous Goods by Air |
| PC | Performance criteria |
| OB | Observable behaviour |

Section 2 Proposed Framework for CBTA

2.1 Overview

2.1.1 According to ICAO, the goal of CBTA is to produce a competent workforce by providing focused training. It does so by identifying key competencies/ capabilities and the level of proficiency to be achieved, determining the most effective way of achieving them and establishing valid and reliable assessment tools to evaluate their achievement.

2.1.2 To ensure personnel are competent to perform any function for which they have a responsibility for the safe transport of DG, they shall be provided with training prior to performing any of these functions that include:

- (a) general awareness/ familiarization training – personnel must be trained to be familiar with the general provisions;
- (b) function-specific training – personnel must be trained to perform competently any function for which they are responsible (i.e. the task list developed in Workflow/Phase 1); and
- (c) safety training – personnel must be trained on how to recognize the hazards presented by DG, on the safe handling of DG, and on emergency response procedures.

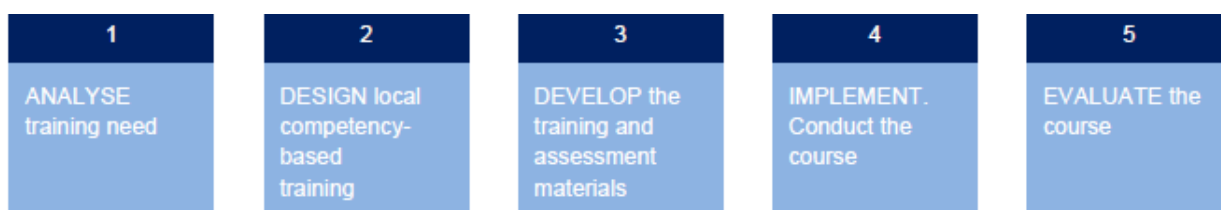
2.1.3 A competency is a dimension of human performance that is used to reliably predict successful performance on the job. It is manifested and observed through behaviours that mobilize/ make use of the relevant knowledge, skills and attitudes (KSA) to carry out activities or tasks under specified conditions.

2.1.4 According to ICAO, examples of KSA applicable to DG personnel include:

- (a) Knowledge
 - (i) The nine classes of DG
 - (ii) Information required on the DG transport document
 - (iii) Components of an acceptance check
- (b) Skills
 - (i) How to determine if the substance/material is DG
 - (ii) How to complete the DG documentation
 - (iii) How to inspect a package
- (c) Attitude
 - (i) Being motivated to ensure safety and to comply with applicable regulations
 - (ii) Wanting to adhere to regulations in asking relevant and effective questions
 - (iii) Appreciating feedback from team members (e.g. adapts when faced with a situation where no guidance or procedure exists)

- 2.1.5 A training programme includes elements such as initial and recurrent training and assessment, instructor qualifications and competencies, training records and evaluation of its effectiveness.
- 2.1.6 Employers are responsible for the establishment of a DG training programme, which involves addressing the training and assessment of their personnel whose functions include responsibility for ensuring that DG are safely transported by air. Some employers may appoint CAD approved third party training providers to assist them in fulfilling these responsibilities which is elaborated further in paragraph 2.1.8.
- 2.1.7 According to the Guidance on a Competency-based Approach to Dangerous Goods Training and Assessment (ICAO Doc 10147) or the Dangerous Goods Regulations (DGR) published by the International Air Transport Association (IATA) (62nd Edition) Appendix H, the establishment of a DG training programme can be divided into five workflows, or phases, namely:
- (i) Analyse training need
 - (ii) Design local competency-based training
 - (iii) Develop the training and assessment materials
 - (iv) Implement – conduct the course
 - (v) Evaluate the course

The five workflows/phases of CBTA



*Reference:
ICAO Doc 10147*

- 2.1.8 Similar to the current DG training arrangement, depending on resource availability and cost-effectiveness considerations, employers may (a) establish and manage their own DG training programmes approved by the CAD or (b) delegate certain aspects of the training programme (for example, elements from the design, development and implementation workflows/phases of training and assessment) to CAD approved third party training providers to fulfil DG training requirements for their personnel. Employers who adopt (a) should refer to paragraphs 2.2 to 2.8 while those who elect (b) may see paragraphs 2.2, 2.3 B), 2.7 and 2.8 of this document for further details.
- 2.1.9 No matter what circumstances are applicable, employers remain ultimately responsible for the overall training programme to ensure competence of their personnel in performing their required functions. This includes conducting training needs analysis and maintaining assessment plans, as well as keeping such records.

2.2 Workflow / Phase 1: Analyse Training Need

- 2.2.1 Conducting a training needs analysis is critical for ensuring that the training to be designed, developed and conducted in later workflow/phases will produce personnel who can perform the job functions for which they are responsible.
- 2.2.2 A training needs analysis may be conducted for each individual employee or category of personnel identified by the employer to be performing similar job functions.
- 2.2.3 At the end of this workflow/phase, employers should have developed the list(s) of tasks that need to be performed by their personnel, whose job functions include responsibility for ensuring that DG are safely transported by air, in a specific operational setting.
- 2.2.4 Employers who elect to appoint third party training providers for DG training of their personnel shall choose the appropriate DG training programme available on the market based on the result of the training needs analysis.
- 2.2.5 ICAO has compiled a list of tasks typically performed by certain well-defined job functions in the air cargo supply chain as well as aircraft operators. The typical tasks are divided into seven broad categories, which are further broken down into smaller sub-tasks:
- 1) Classifying DG
 - 2) Preparing DG shipment
 - 3) Processing/accepting cargo
 - 4) Managing cargo pre-loading
 - 5) Accepting passenger and crew baggage
 - 6) Transporting cargo/baggage; and
 - 7) Collecting safety data

CAD will provide examples at a later stage to assist employers in formulating their training needs analysis based on ICAO's generic list of tasks for personnel who have a role to play in ensuring the safe transport of DG by air in Hong Kong. It is noted some organizations may incorporate the outcome of their training needs analysis into their training policy manuals; in this case, a separate document would not be required.

- 2.2.6 The following well-defined job functions in the aviation industry have been identified by the ICAO as personnel who typically perform the tasks mentioned in paragraph 2.2.5 above, and thus have a role to play in ensuring the safe transport of DG:
- (a) Personnel responsible for preparation of DG consignments;
 - (b) Persons responsible for processing or accepting goods presented as general cargo;
 - (c) Personnel responsible for processing or accepting DG consignments;
 - (d) Persons responsible for handling cargo in a warehouse, loading and unloading unit load devices (ULD) and loading and unloading aircraft cargo compartments;

- (e) Persons responsible for accepting passenger and crew baggage, managing aircraft boarding areas and other tasks involving direct passenger contact at an airport;
- (f) Personnel responsible for the planning of aircraft loading;
- (g) Flight crew;
- (h) Flight operations officers and flight dispatchers;
- (i) Cabin crew; and
- (j) Personnel responsible for the screening of passengers and crew and their baggage, cargo and mail.

2.2.7 For example, tasks typically performed by personnel responsible for preparation of DG consignments, who may be employees of shippers or freight forwarders, include:

- 1) Classifying DG
 - 1.1 Evaluate substance or article against classification criteria
 - 1.2 Determine DG description (including class/ division, packing group, proper shipping name and UN number, etc.)
 - 1.3 Review special provisions
- 2) Preparing DG shipment
 - 2.1 Assess packing options including quantity limitations
 - 2.2 Apply packing requirements
 - 2.3 Apply marks and labels
 - 2.4 Assess use of overpack
 - 2.5 Prepare documentation
- 7) Collecting safety data
 - 7.1 Report DG accidents
 - 7.2 Report DG incidents
 - 7.3 Report undeclared/ misdeclared DG
 - 7.4 Report DG occurrences

2.2.8 Examples of the tasks typically performed by the other well-defined job functions for aircraft operators and their handling agents, security agents, shippers and freight forwarders mentioned in paragraph 2.2.6 can be found in ICAO Doc 10147 or Appendix H of IATA DGR (62nd Edition).

2.3 Workflow / Phase 2: Designing and Planning for the CBTA

To assist providers of DG training or employers who develop their own DG training programme in adapting to CBTA framework, the application form for DG training programme approvals will be revised accordingly and published at a later stage. More details of the approval process and considerations by CAD will be included in the guidance notes therein.

2.3.1 The second workflow/phase in the development and implementation of a CBTA programme is its design. This is done by taking into account the training needs analysis from Workflow/Phase 1.

2.3.2 The intended outcome from this workflow/phase will produce the CBTA components from paragraph 2.1.6, which include:

- (a) establishing a competency model that addresses the list of tasks identified in Workflow/Phase 1;
- (b) designing an assessment plan that will be used to assess the competence of trainees; and
- (c) designing a training plan that will enable the development and delivery of the training course.

A) Establishing a competency model

2.3.3 A competency model for a job function may vary depending on the needs and operating environment of an organization, and should include the following elements:

- (a) The list of competencies/ capabilities required for the job function
 - (i) The list of competencies/ capabilities may be developed using the task list that was identified from Workflow/Phase 1 as basis. For example, a competency may be defined as one of the seven broad categories of tasks mentioned from paragraph 2.2.5.
- (b) Performance criteria for assessing each competency/ capability
 - (i) Each competency/ capability is associated with a list of observable behaviours (OB), and each OB is measured against a competency standard, which may be similar to Key Performance Indicators.
 - (ii) Successfully meeting the defined standards for the list of OBs will contribute to achieving a competency/ capability.
 - (iii) An example of an OB may require a candidate to successfully perform a sub-task within one of the seven broad categories of tasks from paragraph 2.2.5.

B) Designing an assessment plan

2.3.4 A trainee's assessment may be completed using a variety of tools including observation of job performance, tests, or other practical exercises. Assessment tools must be valid and reliable in terms of being an appropriate measure of the competency/ capability being assessed and of obtaining consistent results when administered by different assessors.

2.3.5 Details of an assessment plan may include:

- (a) The list of assessments required for each of the competencies/ capabilities defined
- (b) When assessments should take place
- (c) The tools to be used to collect evidence during practical assessment (where applicable)
- (d) The pass marks for projects, examinations, or oral assessments
- (e) The number of observations required to assess performance for the competency standards

2.3.6 Employers electing to send personnel to third party training providers also need to establish an assessment plan for ensuring that competence has been achieved by the trainee. The employer may incorporate the third party provider's assessment into its established assessment plan. Even if the employer does not deliver any of the training itself, it can still choose to assess the trainees in the workplace to ensure they can

perform their assigned tasks competently and incorporate that process into the assessment plan.

2.3.7 Assessment records must be maintained in accordance with Section 2.8.

C) Designing a training plan

2.3.8 The purpose of the training plan is to detail:

- (a) The composition and structure of the course
- (b) Modules, training events and their delivery format and sequence
- (c) Syllabus
- (d) Milestones (if required); and
- (e) Course schedule

2.3.9 The training plan will be used by the training designers to create the training and assessment materials.

2.4 Workflow / Phase 3: Developing the training and assessment materials

2.4.1 Development of training and assessment materials is based on the competency model and the assessment and training plans from Workflow/Phase 2. It is important to validate development against the analysis and design workflow/phase and it must suitably address the list of tasks identified from the training needs analysis.

2.4.2 Examples of such materials may include training notes, exercise briefings, practical exercises, case studies, presentations, video clips, self-test quizzes, examinations, assessments and assessment tools.

2.5 Workflow / Phase 4: Conducting the training and assessment

2.5.1 Workflow/Phase 4 involves delivering the training; monitoring the progress of the trainees; providing timely and continuous feedback on their performance; diagnosing deficiencies in the training and addressing them in a timely manner; and carrying out assessments according to the assessment plan. The goal of this workflow/phase is a competent employee after completion of training and assessment.

2.6 Workflow / Phase 5: Evaluate the Course

2.6.1 The employer is responsible for ensuring the effectiveness of the training programme. For example, observation of on-the-job performance of the trainee at the end of a period of training may be made to determine if the key competencies have been achieved.

2.6.2 Evaluation of the training should be based on valid and reliable evidence such as course results, trainee feedback, instructor feedback, audit reports, and occurrence reports. This evaluation may lead to changes or improvements being made to the CBTA design.

2.7 Recurrent Training and Assessment

- 2.7.1 Personnel must receive recurrent training and assessment within 24 months of previous training and assessment to ensure that competency has been maintained. However, if recurrent training and assessment is completed within the final three months of validity of the previous training and assessment, the period of validity extends from the month on which the recurrent training and assessment was completed until 24 months from the expiry month of that previous training and assessment.
- 2.7.2 For example, if recurrent training is required by the end of October 2021, then any training occurring between August 2021 and the end of October 2021 will result in a new recurrent training date of October 2023.

2.8 Training and Assessment Records

- 2.8.1 The employer must maintain all records of training and assessment for personnel who have a role to play in ensuring the safe transport of DG by air in Hong Kong. These include records of training needs analysis and assessments to ensure competence of personnel, such as a summary of training records and the relevant training certificate(s) issued by third party training providers, as applicable.
- 2.8.2 Training and assessment records must be retained by the employer for a minimum period of 36 months from the most recent training and assessment completion month and must be made available upon request to CAD.

CAD will provide examples at a later stage to assist employers in preparing records that personnel have been assessed as competent, in performing their tasks relevant to ensuring the safe transport of DG by air and in accordance with the regulations in Hong Kong.

Section 3 The Way Forward

3.1 Enquiries

- 3.1.1 To ensure a smooth transition to competency-based approach to DG training and assessment, CAD will produce examples at a later stage for maintaining DG training and assessment records for compliance by the aircraft operators and their handling agents, security agents, shippers and freight forwarders with reference to the practices of major aviation authorities and in consideration of local circumstances. As the DG training and assessment to be outlined in the examples will resemble the currently adopted arrangement, CAD does not anticipate major difficulties for the industry in complying with the new DG training requirements.
- 3.1.2 If you have any enquiries relating to the proposed framework, please contact us by email at dangerousgoods@cad.gov.hk or by telephone at (852) 2910 6855 / 6856 / 6857.