International Civil Aviation Organization

DGP-WG/20-WP/17
25/9/20

WORKING PAPER

DANGEROUS GOODS PANEL (DGP) WORKING GROUP MEETING (DGP-WG/20)

Montréal, 19 to 23 October 2020

Agenda Item 3: Managing safety risks posed by the carriage of lithium batteries by air

3.1: Consider how lithium battery package standard under development by SAE G27 Committee (AS6413) can be incorporated into ICAO provisions (*Ref: Job Card DGP.003.02*)

3.2: Consider marking, labelling and documentation requirements for lithium battery packages meeting the SAE G27 Committee draft standard AS6413 (*Ref: Job Card DGP.003.02*)

LITHIUM BATTERY PACKAGE PERFORMANCE STANDARD

(Presented by the Secretary)

SUMMARY

Feedback on how confidence can be given to regulators and the aviation industry that a lithium battery package has successfully passed a performance-based safety standard was requested by the SAE International G27 Lithium Battery Packaging Performance Committee that was tasked by ICAO to develop such a standard. This working paper provides background information on the subject and extracts from reports of previous discussions to assist the working group in considering this request.

Action by the DGP-WG: DGP-WG/20 is invited to discuss measures to identify conformance with a test standard and determine what feedback should be provided to the SAE International G27 Lithium Battery Packaging Performance Committee.

1. INTRODUCTION

1.1 The lithium battery package performance standard that the SAE International G27 Lithium Battery Packaging Performance Committee was tasked by ICAO to develop has reached a level of maturing for it to be put through a formal review and voting process (known as the SAE "balloting" process). Consensus is not an expected outcome of this first review, but it will formalize positions on the various aspects of the standard and clearly identify the areas that need further work.

1.2 Earlier versions of the standard included a section on conformance claims and markings, the intent of which was to provide confidence that a specific cell or battery part number combined with a specific package part number were equivalent to a successfully tested combination. The text was eventually removed from the standard, with the recognition that this would be up to the regulators and whoever was using the standard. The committee, understanding that the success of the standard would be dependent on a system that would provide regulators and the aviation industry confidence the specific combination was one that successfully passed the test standard, requested that ICAO be informed that this would not be addressed in the standard. It requested feedback from ICAO as to how the organization intended this activity to be addressed. Accordingly, DGP-WG/20 is invited to discuss the issue and determine what feedback should be provided to the SAE committee.

1.3 Traceability and conformance markings were in fact discussed at DGP/27. An extract from those discussions is provided in paragraph 2 to facilitate discussions. The draft text that the SAE committee developed but subsequently removed from the standard is provided in paragraph 3 as background information.

2. DGP/27 DISCUSSIONS

2.1 Methods to identify the contents of a package and providing traceability were discussed at the twenty-seventh meeting of the DGP (DGP/27, Montréal, 16 to 20 September 2019). An extract of the report of that discussion is provided below to facilitate discussions:

3.1.1 MARKS ON PACKAGES TESTED TO AN EXTERNAL STANDARD TO IDENTIFY CONTENTS AND PROVIDE TRACEABILITY (DGP/27-WP/8)

3.1.1.1 An update on the progress of a performance-based package standard for lithium batteries that the SAE International G27 Lithium Battery Packaging Performance Committee was developing had been given at DGP-WG/19 (see paragraph 3.3.2.1 of the DGP-WG/19 report). Once complete, the DGP would need to consider whether or not the standard should be adopted in the Technical Instructions. If the panel decided to adopt it, measures to provide confidence to the aviation industry that a battery/package combination had successfully passed the standard test would need to be established. Draft text to address this need was developed for a possible new chapter in Part 6 of the Technical Instructions as a basis for discussion. The text attempted to capture the following principles:

a) Identification that the packaging and its contents were consistent with the actual tests performed would be critical to the operator. Operators would likely not accept the packages without being able to verify this.

b) A clear set of marks on the package that identified it met the standard would be needed including the name of the manufacturer and some form of identification that provided an audit trail for components such as configuration, quantity, and the cells or batteries tested.

c) The performance of the test standard should be in accordance with procedures established by the State, and the State approving the marks should form part of any marks applied on the approved package.

3.1.1.2 It was emphasized that the text was presented for the purpose of discussion only, recognizing that the work of the G-27 Committee was ongoing and the standard had yet to be completed. The following points were raised during discussion:

a) One of the two co-chairs of the G-27 Committee was present. He expressed his appreciation for the discussion, particularly in relation to identifying what markings or information would need to be provided for the purpose of oversight and operator acceptance of a lithium battery package. While the SAE committee's role was testing criteria, additional marking that would be needed, who could perform the test, and who could authorize testing would be ICAO's role.

b) The scope of the SAE standard was questioned, i.e. would it apply to passenger aircraft only or to both passenger and cargo aircraft. The SAE co-chair noted that this query was raised repeatedly on the committee. The answer had always been that this decision was not the committee's to make. It's job was to create a performance-based standard that could be used to determine whether the hazards from a thermal runaway event could be maintained within the package. It was intended for the standard to apply to both lithium ion and lithium metal cells. It would be up to ICAO to determine whether it should be implemented for transport by air and, if so, how.

c) The need to take into account the use overpacks and whether any markings would be required on them was noted.

d) There needed to be a clear indication that a package met the SAE standard. This might involve a separate mark or be an additional component of the UN specification marking. It was suggested the marking could identify approval by a State or an independent third party authorized by a State.

3.1.1.3 The chair of the UN Sub-Committee was present and noted the committee had begun discussions on establishing a general mechanism for determining if a packaging is able to mitigate hazards associated with articles with the potential to produce excessive heat. This would include a method of determining who did the package testing, what the results were and whether a particular package had been subject to additional testing. It was suggested that the outcome of this work might support efforts to provide confidence to States and industry that a lithium battery package met the SAE package standard.

3. TRACEABILITY INFORMATION IN THE CURRENT VERSION OF THE DRAFT PROPOSED STANDARD

3.1 The current version of the standard includes documentation requirements intended to provide evidence of conformity of the assembled package and its contents to the minimum performance requirements. There are two required reports. One report is intended to be kept by the organization that qualifies the test and includes very detailed information regarding the manufacturers of the batteries, cells and packaging material; specific descriptions of the packaging material, lithium batteries or cells and the instruments used for the test; specific procedures followed in conducting the test; and detailed, visual evidence of a successful test. The second report is a summary report that is intended for the user of the package and includes more general information about the battery or cell and packaging material and information necessary to validate the successful conduct and completion of the test.

4. DRAFT TEXT ON QUALITY MANAGEMENT

4.1 The text the SAE committee had originally drafted, which will no longer appear in the standard, is provided below. It is provided so that the DGP can have a better understanding of the information the SAE committee considered was important for effective quality management.

Conformance claims and markings

(Rationale: The success of a test can be due to any combination of the performance of a cell/battery and of a packaging. Therefore, it is only valid for a specific cell/battery part number combined with a specific package part number. As it is recognized that minor changes in one or another part do not necessarily change the result of the safety test, it is necessary to clarify what are the rules applicable and the required traceability information to use the results of a test for similar parts with different part numbers. For this purpose, there is a need to define the notion of "type" and "equivalent qualification").

The organization responsible for the qualification (P.Q.O) test shall keep an updated register for the traceability information specified below of all products/packaging qualified under his responsibility (or delegate this responsibility to a specialized organization). This traceability information shall be readily available to competent State Authorities with valid identification and only upon their formal request at the contact point provided by the P.Q.O.

The table below is provided as an example of a P.Q.O. list of test, with the required information for traceability. Table example:

Test Number	Equivalent test number	Battery /cell number	Battery /cell group number	Maximum SOC	Packaging number	Packaging group number	[Maximum] number cells/batt	Other/ comments
T1	N.A	B111	T11	30%	P111	P11	480	
T1	T11	B112	T11	30%	P111	P11	XX	Equivalent cell in the same package
T1	T12	B111	T11	30%	P112	P11	XX	Equivalent package for the same cell

Configurations of cell/batteries and packaging determined to be equivalent to tested configuration; Listing of equivalent configurations to a tested configuration must be maintained by PQO and readily available to [users], [this could be at the summary report level or some other document or web page, etc]. Rationale for equivalency of changes, such as the ones identified in Section 1.2, must be auditable [documented and retained by PQO and available for auditors]. [Marking: if evidence of compliance to this standard is intended to be visible at the package level, a unique identifier should be utilized that provides traceability to the PQO and the test summary of the report used for qualification of the package. This could be problematic, especially for outer packaging that could be used for a variety of different configurations.] [Shipper declaration may be another method for evidence of compliance]

5. ACTION BY THE DGP-WG

5.1 DGP-WG/20 is invited to discuss measures to identify conformance with a test standard and determine what feedback should be provided to the SAE International G27 Lithium Battery Packaging Performance Committee. In particular, does the scope of the SAE standard, as proposed by the SAE committee, make the standard usable and provide a sufficient level of confidence with respect to traceability?

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