US Department
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Research and
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Questions and Answers Regarding Packaging Testing and Certification

1. **If a packaging is to be used for a solid hazardous material (powder) and filled for shipment to less than 95% of the capacity, may it be tested when filled to the intended filling capacity?**

   ANSWER: No. Regardless of how a packaging will be filled during production, it must be filled and prepared for testing in accordance with 49 CFR 178.602. For the drop and stacking tests, inner and single-unit receptacles must be filled to not less than 95 percent of their maximum capacity in the case of solids.

2. **a. For packagings used to meet the requirements of 49 CFR 173.226 or 173.227, should an inner and outer drum be tested together to meet the outer drum requirements? Can the outer drum be tested by itself, to meet the outer drum requirements? If so, should the outer drum be filled with a liquid or solid for testing? Can two drums be tested and certified individually at the Packing Group I level, and then combined to form the packaging, provided all other requirements of 49 CFR 173.226 or 173.227 are met?**

   ANSWER: For packagings intended for materials poisonous by inhalation, the inner drum must be tested in accordance with Subpart M of Part 178, at the Packing Group I level, as appropriate for the liquid to be contained therein. The outer drum used in this packaging system must also be tested in accordance with Subpart M of Part 178, at the Packing Group I level. There are three acceptable methods of testing the outer drum for compliance with this requirement:

   i. The outer drum may be tested as an outer steel drum intended to contain inner packagings. If this method is used, the drum-within-a-drum packaging must be prepared as if for transportation. The inner drum is filled with liquid and cushioned in place inside the outer drum. In addition to the drop and stacking tests required by Part 178, the outer drum must be subjected to a 100 kPa hydrostatic pressure test, as required by §§ 173.226(b) or 173.227(b). A drum tested in this manner is marked as a packaging tested for solids or inner packagings; that is, the 100 kPa pressure test is not reflected in the UN packaging marking.

ii. The outer drum may be tested as a single steel drum intended to contain solids. For testing in this way, the steel drum must be filled to not less than 95% of capacity with a solid material. Gross weight of the drum filled for testing must at least equal the weight of the filled, completed drum-within-a-drum package. In addition to the drop and stacking tests required by Part 178, the outer drum must be subjected to a 100 kPa hydrostatic pressure test, as required by §§ 173.226(b) or 173.227(c). A drum tested in this manner is marked as a packaging tested for solids or inner packagings; that is, the 100 kPa pressure test is not reflected in the UN packaging marking.

iii. The outer drum may be tested as a single steel drum intended to contain liquids. For testing in this way, the steel drum must be filled to not less than 98% of maximum capacity with a liquid material. Gross weight of the drum filled for testing must at least equal the weight of the filled, completed drum-within-a-drum package. The outer drum must be drop, stack, and leakproofness tested in accordance with Part 178. The hydrostatic pressure test required by § 178.605 must be performed at a test pressure of 250 kPa, as is required for all drums intended to contain Packing Group I liquids. A drum tested in this manner is marked as a packaging tested for liquids; that is, the 250 kPa test pressure is reflected in the UN packaging marking, but the tested gross weight is not.

b. For a combination packaging with an outer fiberboard box, with a round metal can inner packaging system, from what orientations should the inner packaging system be dropped?

ANSWER: The round metal can inner packaging system should be drop tested from the orientations required for steel drums and composite packagings which are in the shape of a drum (see § 178.603(a)).

3. **If a single packaging is due for periodic retesting on November 23, 1994, and the periodic retests are not completed until January 15, 1995, by what date must periodic retests be repeated?**

ANSWER: The next periodic retest must be completed by January 15, 1996. For single packagings, periodic retesting must be completed within 12 months of the design qualification tests or the last periodic retest. In the example given, if packagings were manufactured, marked, and sold as UN packagings after November 23, 1994, and before periodic retesting had been completed, the manufacturer would be in violation of the Hazardous Materials Regulations. After periodic retests were completed (January 15, 1995), the manufacturer would have another 12 months in which to perform periodic retests.

4. **Is it appropriate to continue using the same certification number when minor modifications are made to a certified packaging, as long as the periodic retest report documents the modifications? For example, if the original design qualification test for a UN 4G packaging was conducted with a top pad, and the packaging passes all periodic retests without this top pad, is it permissible to continue to use the same certification number so long as the periodic retest report documents this change?**

ANSWER: If a packaging was originally tested with a top pad, a packaging without the top pad is considered a different packaging. A new set of design qualification tests, rather than periodic retests, must be performed. A single test number may be used to identify more than one packaging, as long as the test report identifies all of the packaging variations being represented by that number. For example, if a box has been tested using three different closure methods, boxes with all three closures may be marked with the same certification number. The test report must show that all three closure methods were used, and all three closure methods must be tested at the time of periodic retesting. If the specific design type can be identified on the test report, the same certification number may be used for more than one design; however, a single certification number should be used only to identify packagings which differ in minor respects.

5. **Is there a maximum length of time to complete the design qualification tests? For example, if a UN 1H1 single packaging for liquids has passed all the test requirements except for one drop orientation, is it appropriate for the manufacturer of this plastic drum to submit additional samples to complete the test, 3 months from the start of the original test? At what point must all tests be rerun?**

ANSWER: A packaging is not an authorized UN packaging until design qualification testing has been completed in accordance with 49 CFR Part 178. Packagings cannot be represented and sold as UN packagings until all design qualification tests are completed. There is no specific time frame for completion of the initial design qualification tests. However, if a packaging design has passed all tests but one, and the packaging must be modified in some way in order to pass the remaining test, ALL tests must be repeated on the modified packaging before it can be certified to the UN standard.

6. **In the design qualification tests for DOT Specification 35 plastic drums (1990 49 CFR §178.16-13(a)(1)(ii)), there is a retest provision which reads: "In the event of failure, the individual orientation drop test causing the failure must be repeated with six additional drums. Failure of any of the six additional drums disqualifies that size or design from this specification until design qualification tests have been successfully repeated."**

The subject of retesting in the event of failure (e.g. where one sample fails a drop test) is not addressed in the current performance testing requirements. Because variability is inherent in any manufacturing operation, can a retest mechanism such as that prescribed for DOT Specification 35 packagings be used for design qualification testing and periodic retesting?

ANSWER: The intent of the Hazardous Materials Regulations is that the required number of samples be tested and each one passes. Every packaging produced must be capable of passing the tests of 49 CFR Part 178. If a packaging fails one of the prescribed tests, the design fails unless the tester can document what caused the failure, and successfully re-run the tests. The third party certification agency must assess the reason for a packaging failing a test. If it is simply a matter of an improperly applied closure, the certification agency can document that reason, and re-run the test. If the reason for failure is related to the packaging design, the packaging design fails, the packaging design must be modified, and ALL tests must be redone.

7. **A third party packaging certification agency is required to submit an annual activity report to RSPA's Office of Hazardous Materials Exemptions and Approvals by February 1st. Is the agency obligated to file an activity report even if it did not conduct any third party testing programs during the preceding year? What are the consequences of failing to file this activity report?**

ANSWER: A packaging certification agency must file an annual activity report to the Approvals program even if the agency has not conducted any third party testing within the previous calendar year. The letter of designation as a certification agency specifies in Special Condition 5: "... If there has been no activity you must provide a report indicating no activity for that year. This report must be submitted ... by February 1st for each previous calendar year." The consequences for failing to file this report or for filing late can include civil penalties and/or possible revocation of your approval as a third party packaging certification agency.

8. **With regard to the types of packagings that can be tested by third party certification agencies, are any special approvals required for Type A packagings for radioactive materials?**

ANSWER: The approval issued to a third party to act as a certification agency for UN packagings does not apply to Type A radioactive materials packagings. The testing required for packagings to qualify as Type A packagings for radioactive materials is completely different from and has

no relation to the performance-oriented packaging requirements of 49 CFR Subpart M of Part 178. However, a third party certification agency may test Type A packagings if it has the capability to do so.

9. **Are high pressure gas cylinders expected to be subject to UN testing requirements in the near future?**

ANSWER: The International Standards Organization (ISO) is developing international standards for the manufacture of gas cylinders. While these international standards may be included in the UN Recommendations, gas cylinder requirements will not be included in the performance testing requirements of Chapter 9 of the UN Recommendations.

10. **May a third party certification agency accept a customer's certification that inner packagings meet the internal pressure capability requirements of 49 CFR 173.27(c) for air shipments? If an inner packaging has been tested and meets the internal pressure capability requirements, is it necessary to retest the inner packagings periodically to assure continued compliance with those requirements?**

ANSWER: The hydrostatic pressure test of 49 CFR 178.605 is not required for the inner packagings of combination packagings. Inner packagings which are to be shipped by air must meet the internal pressure capability requirements of 49 CFR 173.27(c). It is the shipper's responsibility to ensure that inner packagings are appropriate for air shipments. A third party certification agency need not assess the inner packagings' capability to withstand the internal pressures of 49 CFR 173.27(c) in certifying a packaging to the UN standard. Therefore, in recertifying a package design, it is not necessary to repeat a test which was conducted to assure compliance with 49 CFR 173.27(c).

11. **A steel drum which is performance tested by the manufacturer and certified at the Packing Group II level is marked with the "Y" designation in the embossed UN code. If this drum is successfully tested by the user to Packing Group I performance standards, can an additional marking be placed on the drum to indicate a Packing Group I certification?**

ANSWER: Yes. The person who performs the testing at the Packing Group I level may apply the UN marks to the drum in accordance with 49 CFR 178.503. As required by 49 CFR 178.3(c), this second marking must be a complete marking, including all elements required by 49 CFR 178.503(a). The "name and address or symbol of the manufacturer or the approval agency" must be that of the user who performed the tests to prove compliance with Packing Group I standards. The drum user is then subject to all requirements of Part 178 as a manufacturer. A drum user should exercise caution in retesting and remarking packagings. In placing the additional marking on a drum, the new "manufacturer," the drum user, must ensure that all drums being marked are

identical to the drums tested to the higher performance standard. The original manufacturer may have made modifications to drums which would not be evident in the marking.

12. **What is the method for stack testing packagings that due to their shape could not normally or safely be stacked one on another? May packagings that bear a label which prohibits stacking be excepted from the stack testing requirement?**

ANSWER: Such packagings should be subjected to a stack test. This may be accomplished by means of a guided load test. While some packagings are not specifically designed for stacking, virtually all have the potential of being stacked, by means of plywood sheeting, for example. The UN Recommendations, and the performance testing requirements of Subpart M of Part 178, make no exception from the stack test requirement for packagings which cannot safely be stacked one on another. A non-bulk packaging other than a bag may not be certified to a UN standard unless it has been subjected to the stack test.

13. **How should packagings for infectious substances be marked? Some labs recommend that packagings be marked with a statement that the packaging complies with 49 CFR 178.609. Some certification agencies are already using marks recently adopted in the UN Recommendations, paragraph 6.13.5. Should an approval number be issued for packagings tested to meet the requirements for infectious substances?**

ANSWER: Packagings which meet the requirements for packagings for infectious substances are not currently required to be marked as conforming to 49 CFR 173.196 or 178.609. The UN Recommendations (6.13.5) include marking requirements for packagings which meet the requirements for materials in Division 6.2. These marking requirements have not been adopted into 49 CFR, but will be required under the 1995-96 ICAO Technical Instructions. While not required under 49 CFR, these markings may be applied to packagings tested in accordance with 49 CFR 178.609, and meeting all other requirements of 49 CFR 173.196. A unique test report identification number (approval number) may also be issued. The third party certification agency's mark may only be applied if the agency has identified this type of packaging as one which they will be testing, and has submitted a sample test report for this type of packaging to the Office of Hazardous Materials Exemptions and Approvals.

Alternatively, packagings may be marked with a statement of compliance with 49 CFR 178.609. Many packagings for infectious substances are being marked with the UN markings prescribed by 49 CFR 178.503 as Packing Group I packagings, representing the highest performance capability for which markings are currently prescribed. Such markings, while not prohibited, may be misleading, since these packagings greatly exceed Packing Group I requirements.

14. **Will there be a periodic retesting requirement for infectious substances packagings?**

ANSWER: No periodic retesting requirements are being considered for infectious substances packagings at this time. If RSPA proposes, through rulemaking, adoption of the new UN requirements for infectious substances packagings, periodic retesting may also be proposed.

15. **Are chemical compatibility tests required for plastic secondary packagings for packagings conforming to 49 CFR 178.609?**

ANSWER: Chemical compatibility tests, when required by 49 CFR 173.24(e), are mandatory only for the primary receptacle.

16. **Can maximum gross mass be marked on a packaging to the nearest 0.1 of a kilogram for greater accuracy, or must the gross mass be rounded down to the next lowest whole number?**

ANSWER: The maximum gross mass of a package, marked in accordance with 49 CFR 178.503(a)(4)(ii), may be specified to 0.1 of a kilogram. The packaging may not be marked to a weight higher than what was tested.

17. **Are any changes to the regulations being considered to require the hydrostatic test pressure to be marked on a combination packaging?**

ANSWER: No. The hydrostatic pressure test is not required for combination packagings and no such requirement is being considered at this time. It is permissible to include information regarding the hydrostatic test pressure in addition to the required markings, provided such information does not interfere with the required information.

18. **What is the difference between a 4G box and a 4G certified packaging? 49 CFR calls for a "4G" box to be used to overpack certain cylinders containing gases (see 49 CFR 173.340(c)(3) and 173.40(d)(1)). The latter even requires a 2 m. drop capability.**

ANSWER: There is no such thing as a "4G" box which has not been tested and certified. In order for a packaging to be marked as conforming to a UN standard like the 4G, it must have been tested in accordance with Subpart M of Part 178. If the regulations require a UN standard packaging as an outer packaging, that packaging design type must have been tested.

19. **If a component of a packaging (e.g., an inner bottle) was manufactured outside of the United States, can the packaging be marked "USA?"**

ANSWER: The "USA" mark may only be applied to a packaging which was manufactured in the United States. A packaging which was assembled, tested, and marked in the United States could be considered to have been manufactured in the United States and marked "USA," even if one or more of the components were manufactured outside of the United States. In any case, the packaging must be physically marked in the United States in order to bear the "USA" mark. Packagings which are manufactured and marked outside the United States should be marked in accordance with the requirements of the country where the packaging was manufactured.