



DANGEROUS GOODS PANEL (DGP)

TWENTY-THIRD MEETING

Montréal, 11 to 21 October 2011

Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2013-2014 Edition

REVISION TO PACKING INSTRUCTION 869 FOR MERCURY IN MANUFACTURED ARTICLES

(Presented by D. Brennan)

SUMMARY

This working paper proposes a revision of Packing Instruction 869 to remove the current inconsistencies.

Action by the DGP: The DGP is invited to consider:

- a) a complete revision of Packing Instruction 869 to develop a standard set of criteria for packaging of manufactured articles which contain mercury. It is suggested that the revisions to the content of the packing instruction should be as presented in Appendix A to this working paper.
- b) a revision to Special Provision A69 to move from Packing Instruction 869 into Special Provision A69 the exception for thermometers, switches and relays each containing not more than 15 g of mercury if they are installed in as an integral piece of a machine or apparatus. It is also proposed to include into A69 provision for lamps containing small quantities of mercury. The proposed changes to A69 are also presented in Appendix A to this working paper.

1. INTRODUCTION

1.1 At the DGP Working Group of the Whole Meeting in Atlantic City (DGP-WG/11, 4 to 8 April 2011), a proposal was submitted to revise Packing Instruction 869 to remove certain inconsistencies from the existing packing instruction and to remove conflicting requirements such as where one part of the packing instruction calls for the net quantity of mercury to be shown on the

dangerous goods transport document for certain articles, when the provisions of Part 5;4 call for the shipper to state the gross mass of the completed package (DGP/23-WP/3, paragraph 3.2.21 refers).

1.2 While there was some support for the original proposals, some concerns were raised. Based on these concerns it was agreed that there would be consultation with interested parties to seek input for a revised proposal to DGP/23.

1.3 A request was sent out for comments on what additional measures may be appropriate to include into Packing Instruction 869 to address any safety concerns associated with the transport of manufactured articles containing mercury, however almost no response was forthcoming.

1.4 To address the specific comments provided at DGP-WG/11 there have been some revisions to Packing Instruction 869 shown in Appendix A. These changes have removed the term “jacketed”, which was seen as being dated and not consistent with language normally used in the Instructions.

1.5 It is also proposed to remove “no limit” from the packing instruction and instead it is suggested that a limit of 5 kg per package for passenger aircraft and 50 kg for cargo aircraft should be applied. These values are shown in square brackets and the views of the panel are sought on the appropriateness of these limits being applied.

1.6 One additional issue that was raised was that of lamps containing mercury, which are not specifically addressed in the existing Packing Instruction 869. Information received from a large manufacturer of lamps used in commercial lighting applications identifies that there are a wide range of these lighting applications where the lamps contain small quantities of mercury, typically less than 700 mg, although there are some larger lamps for special application that contain up to 3.5 g of mercury.

1.7 The design of these commercial lamps is such that the mercury is contained in an inner discharge tube manufactured from quartz glass or ceramic material. The inner discharge tube is very robust and is unlikely to break during transport. In addition, for most lamps the inner discharge tube is contained in a second envelope of hard or quartz glass, examples of these lamps are shown in Appendix B.

1.8 When packed for transport each lamp is individually packed in an inner sleeve or box before being packed into outer packagings. Packages as prepared for transport must meet the UN-D 1400 Complete, Filled Transport Packages drop tests, copy attached in Appendix C, to ensure that the products are not damaged in transport and are received by the end-user in good order and condition. One large manufacturer advised that their damage rate equates to 120 lamps damaged per one million lamps transported.

1.9 It is therefore proposed that lamps containing mercury meeting these conditions should be considered for removal from being shipped as UN 3506 and instead provision made to except them from the Instructions.

APPENDIX A

PROPOSED AMENDMENTS TO THE TECHNICAL INSTRUCTIONS

Part 4

PACKING INSTRUCTIONS

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Replace Packing Instruction 869 with the following:

Editorial Note.— Marked changes in Packing Instruction 869 below are against the revised packing instruction presented at DGP-WG/11 (DGP/23-WP/3, paragraph 3.2.21 refers).

Packing Instruction 869

Passenger and cargo aircraft for UN 3506 contained in manufactured articles only

General requirements

Part 4, Chapter 1 requirements must be met, including:

1) **Compatibility requirements**

- Substances must be compatible with their packagings as required by 4;1.1.3.
- Metal packagings must be corrosion resistant or be protected against corrosion.

2) **Closure requirements**

- Closures must meet the requirements of 4;1.1.4.

COMBINATION PACKAGINGS			SINGLE PACKAGINGS
UN number and proper shipping name	Total Net quantity per package — passenger	Total Net quantity per package — cargo	
UN 3506 Mercury contained in manufactured articles	No limit[5 kg]	No limit[50 kg]	No

ADDITIONAL PACKING REQUIREMENTS

- Manufactured articles or apparatuses of which metallic mercury is a component part, such as manometers, pumps, thermometers, and switches, must be packed in sealed inner liners or bags of strong leakproof and puncture-resistant material impervious to mercury which will prevent the escape of mercury from the package irrespective of its position before being packed in outer packagings.

Note.— Mercury switches and relays are excepted from the requirement for a sealed inner liner or bag providing they are of the totally enclosed leakproof type in sealed metal or plastic units.

- Electron tubes, mercury vapour tubes (tubes with less than a total net quantity of 450 g of mercury) must be packed in strong outer packagings with all seams and joints sealed with self-adhesive, pressure-sensitive tape which will prevent the escape of mercury from the package.

Note.— Tubes with more than 450 g of mercury must be packaged according to the requirements for manufactured articles or apparatuses.

- Electron tubes which are ~~completely jacketed~~ packed in sealed leakproof metal cases may be shipped in the manufacturer's original packagings.

OUTER PACKAGINGS OF COMBINATION PACKAGINGS (see 6;3.1)

Boxes

Drums

Jerricans

Strong outer packagings

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Part 3

**DANGEROUS GOODS LIST,
SPECIAL PROVISIONS AND
LIMITED AND EXCEPTED QUANTITIES**

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Table 3-1. Dangerous Goods List

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Editorial Note.— For the purpose of this working paper, only amendments to columns 11 and 12 should be considered. Amendments to Columns 2, 4 and 5 are as presented in DGP/23-WP/6.

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Excepted quantity	Passenger aircraft		Cargo aircraft	
									Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12	13
Mercury contained in manufactured articles	2809 3506	8	6.1	Corrosive & Toxic		A48 A69	III	E0	869	No-limit [5 kg]	869	No-limit [50 kg]

...

Table 3-2. Special provisions

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A69

The following are not subject to these Instructions when carried as cargo:

- a) Articles, each containing not more than 100 mg of mercury, gallium or inert gas and packaged so that the quantity of mercury, gallium or inert gas per package ~~does not exceed~~ is 1 g ~~or less~~, ~~are not subject to these Instructions when carried as cargo.~~
- b) Thermometers, switches and relays, each containing a total quantity of not more than 15 g of mercury, if they are installed as an integral part of a machine or apparatus and so fitted that shock or impact damage, leading to leakage of mercury, is unlikely to occur under normal conditions of transport.
- c) Lamps, each containing not more than 1 g of mercury and packaged so that there is not more than [30 g] of mercury per package. Packages must be so designed and constructed such that when subjected to drop tests from a height of not less than 0.5 m the packages must still be fit for transport and there must be no damage to the contents.

The words "not restricted" and the special provision number A69 must be provided on the air waybill when an air waybill is issued.

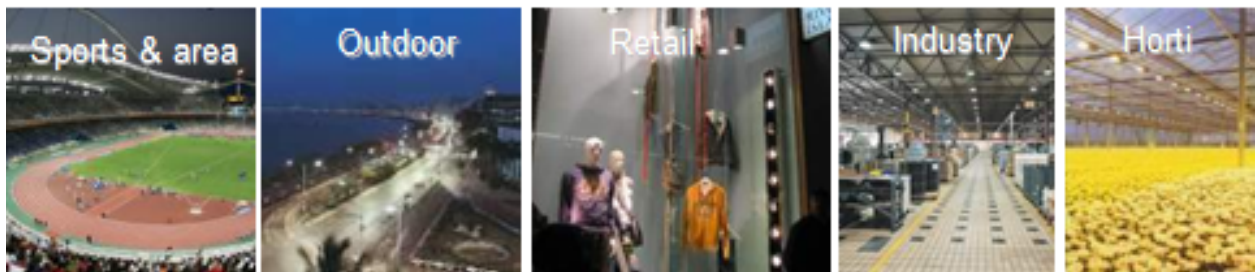
APPENDIX B

EXAMPLES OF LAMPS CONTAINING MERCURY

PHILIPS

HID Business

General Lighting Applications



- HPI
- MHN SA/LA



- SOX
- SON
- HPL
- CDO
- CPO



- CDM
- MHN
- SDW-T(G)



- HPI
- CDM



- GreenPower
- SON
- HPI

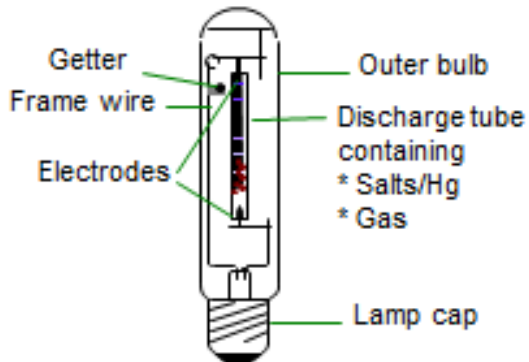


PHILIPS

HID lamp technology

Some insights

Lamp details



APPENDIX C

DROP TEST/CANT DROP TEST (UN-D1400)

Drop test

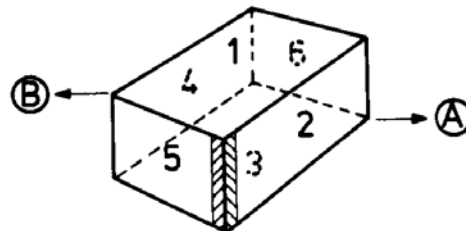
Notes.—

1. The products with which packaging tests are carried out shall have been tested.
2. A new package shall be used per test method.
However, the dispensation allowed by clause 3.1 can override this requirement. In case a test method is applied as part of a sequence of test methods the levels given in this standard may be inappropriate (too high) and require modification.
3. It is recommended that the product be checked for damage after each test method.

General requirements

1. The package to be tested has to be fastened in a specified position that face-drop, edge-drop and corner-drop can be done.
2. The package has to make a free fall.
3. The floor upon which the package strikes shall have a horizontal, flat surface and be massive and rigid enough not to move or be deformed during the test.

Description of the drop test programmes:



Programme 1

Drop each package under test once on each face (1-6) and thereafter also once on an edge or corner (free to choose)

→ total 7 drops

Programme 2

Drop each package under test once on each of three mutually perpendicular faces (start with 3) and then once on an edge proceeding from the corner at the junction of these faces or on that corner itself (e.g. 5-3)

→ total 4 drops

Programme 3

Drop each package under test on the face on which it will rest (3) in transit and then on one of the edges along that face

(preferably 5-3)
→ total 2 drops

Drop heights

- The drop heights of packages with a mass up to 6,6 kg are the same for the three afore mentioned programmes and depend only upon the mass of the package.
- The drop heights of packages with a mass of more than 6,6 kg are the same for the programmes 1, 2 and 3 and depend only upon the mass of the package.

For drop programme 1, 2 and 3

Mass in kg	Height in m	Mass in kg	Height in m
1	1,00	16	0,59
2	1,00	17	0,58
3	0,95	18	0,57
4	0,90	19	0,56
5	0,86	20	0,55
6	0,82	21	0,54
6,6	0,80	22	0,53
7	0,79	23	0,53
8	0,76	24	0,52
9	0,73	25	0,52
10	0,70	26	0,51
11	0,68	27	0,51
12	0,66	28	0,50
13	0,65	29	0,50
14	0,63	30	0,50
15	0,62	31-50	0,50

Cant drop test

Cant-drop programme 1

Description of the package

This programme 1 applies to:

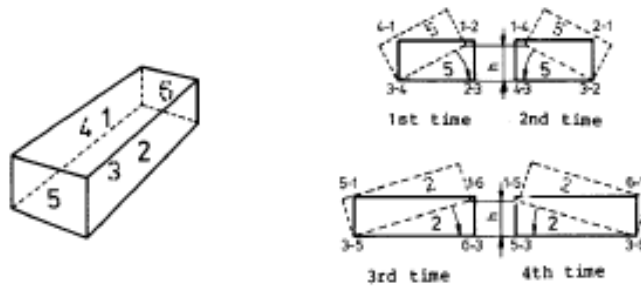
- a package whose mass is 50 - 100 kg and which is to be carried on one side only.
- a unit load, made up of not individually tested transport packages whose mass < 500 kg.

Test procedure

This programme calls for the package to be canted once on each edge of its base surface (3) and allowed to fall back each time, thus sustaining four impacts on that surface.

The package must not be tilted beyond $h = 0,4$ m.

→ Agreed is upon 200 mm height during a pallet cant drop test.



Drop test matrix

	Programme 1	Programme 2	Programme 3	Cant drop test
Category 1			x	
Category 2		x		
Category 3	x			
Bulk packaging				x
Multi pack	depends on prod	depends on prod	depends on prod	n.a.

Product category 1: “Outdoor” SON (T, O), CDO (TT, ET), HID (T, O)

Product category 2: CPO, CDM (T, TC, TP, TD, R111, Tm Mini), PAR (Rm, 20, 30), Sports

Product category 3: “Specials” : MSR, SOX,

Bulk packaging: Ttauri, OB, DGA, OEM (tray verpakking)

Multi pack (multiple item packaging handled/transported like a single box) : Depends on product class (e.g. MSR prog 1) Mazda and Bairo do not have a specific programme, these follow the standard Philips programme for that particular lamp type.

Test requirement

After testing, the package shall still be presentable in visibly good condition and the product shall still satisfy the relevant product specification, at the discretion of the testing authority concerned.

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