



WORKING PAPER

**DANGEROUS GOODS PANEL (DGP)
MEETING OF THE WORKING GROUP OF THE WHOLE**

Beijing, China, 25 October to 3 November 2006

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 2009/2010 Edition

2.3 Part 3 — Dangerous Goods List and Limited Quantities Exceptions

2.4: Part 4 — Packing Instructions

XENON LAMPS AND OTHER TYPES OF LAMPS

(Presented by T. Yoshizawa)

SUMMARY

This paper discusses Xenon Lamps and seeks clarification as to which UN number and packing instruction number should be assigned to them. It proposes an amendment to Packing Instruction 916.

Action by the DGP-WG is in paragraph 2.

1. INTRODUCTION

1.1 Recently we received a query from a freight forwarder with an electric manufacturer concerning which UN Number and which Packing Instruction should be appropriately applied to Xenon Lamps, which have the pressure of Xenon (Div. 2.2 Non-flammable gas) over 280 kPa inside the lamp bulbs. Generally we have taken it for granted that pressure of this kind of inert gas in lamp bulbs or fluorescent lamps is usually under 280 kPa, making them not subject to the provisions of TIs. After consulting the TIs and DGP members, we could not find the appropriate UN Number and packing instruction.

1.2 What is actually assigned to these products by the manufacturer is UN 3363 Dangerous goods in apparatus, Class 9, PI 916. According to PI 916, the apparatus may contain dangerous goods permitted under 3;4.1.2. (Ltd Qty), but for Div. 2.2 gases, cylinders for gases, their contents and filling ratios must conform to the requirements of PI 200, and the total net quantity of dangerous goods contained in one package must not exceed 0.5kg. With this condition, since Xenon Lamps are not considered as “cylinders”, we think it is not reasonable to assign UN 3363 to these Lamps.

1.3 At this point we have not had enough time to make a complete survey on Xenon Lamps and Other Type of Lamps, but the information in the appendices to this paper provide an outline of Xenon Lamps with pressure exceeding 280kPa and other types of lamps to be considered as dangerous goods.

2. ACTION BY THE DGP-WG

2.1 The DGP-WG is invited to:

- a) discuss this matter to be solved;
- b) in the interim, consider the following amendment to Packing Instruction 916:

...

In addition:

...

- e) For Division 2.2 gases, cylinders ~~for gases~~ or receptacles, their contents and filling ratios must conform to the requirements of PI 200 or to the satisfaction of the competent authority of the State where cylinders or receptacles are filled.
- c) discuss this matter to be regarded as not subject to these Instructions, considering the fact that these products have been manufactured since 1957 and transported by air with no incident at all for more than 48 years. Another reason is that Xenon Lamps are made so as to withstand approximately four times as much pressure in operation as the pressure upon non-operated at ordinary temperature;
- d) consider to make it allowed to use Ltd Qty as Part 3; 4.1.2. stipulates Div. 2.2, gases without subsidiary risk may be carried under limited quantities, although there is no indication of Ltd Qty in the Table 3-1, Dangerous Goods List, for Div. 2.2 except aerosols, gas cartridges and receptacle, small, containing gas.

APPENDIX A

TYPES OF XENON LAMP MANUFACTURED IN JAPAN

Use	Electric Power (W)	Gas Pressure (MPa)	Contents Capacity (mL)
Flash Lamps for Copiers, Facsimiles, Photographing, Signals, Automobiles, Medical Treatment Apparatus, etc.	10.2	0.22 (= 220 kPa)	0.033
	1.7	0.22 (=220 kPa)	0.007
	3.9	0.01 (= 10 kPa)	0.306
	0.4	0.15 (= 150 kPa)	0.008
Short Arc Lamps for Large and high quality projectors, High-intensity projectors with writable LCD's, Spectrophotometers, Endoscopes, Image processing, Solar simulators, Standard light source, Search lights, Planetarium, etc.	75	4.5 (=4,500 kPa)	0.5
	150	2.0 (=2,000 kPa)	2.5
	300	0.8 (= 800 kPa)	1.0
	300	1.5 (=1,500 kPa)	6.0
	500	1.0 (=1,000 kPa)	10.0
	500	1.5 (=1,500 kPa)	20.0
	1,000	1.0 (=1,000 kPa)	50.0
	2,000	1.0 (=1,000 kPa)	120.0
	3,000	1.0 (=1,000 kPa)	120.0
	4,000	1.0 (=1,000kPa)	150.0
	5,000	1.0 (=1,000 kPa)	150.0
	6,000	1.0 (=1,000 kPa)	285.0
7,000	1.0 (=1,000 kPa)	285.0	

○The above table shows typical two kinds of Xenon Lamps manufactured in Japan.

○In Japan, there are four manufacturers as follows.

Ushio Electric ——manufacturing all kinds of xenon lamps.

Matsushita Panasonic——manufacturing only flash lamps

Iwasaki Electric——manufacturing only 300W type with 0.8MPa.

Mitsubishi Osram——not manufacturing but importing Osram's product.

(Koito Seisakusho and Stanley Electric are manufacturing other types of lamps for automobiles than xenon lamps.)

○It seems that Osram, a German manufacturer, and Ushio Electric are sharing the world market of Xenon Lamps, especially Xenon Short Arc Lamps.

○The above Flash Lamps have no problem since the pressure of 2.2 gas is under 280kPa, but there is a need to consider about the above Short Arc Lamps to be treated as Dangerous Goods with how to be packed and what proper shipping name should be applied.

Outline of Gas Pressure of Lamps

On this opportunity, please have a look at Outline of Gas Pressure of Lamps in Appendix B, which

includes not only xenon lamps but also other types of lamps. You will see “Yes” in the columns of “Pressure not less than 280kPa”, which means to be treated as Dangerous Goods. Halogen lamps, HID lamps and Xenon lamps may be subject to be treated as Dangerous Goods. In the column of “Sealed Substances”, you will see Mercury contained, but I checked and found that all these products contain Mercury not more than 100mg. Therefore, the gas pressure is the only subject we have to consider.

(3) Other Attachments

- 1) Halogen lamps
- 2) Xenon Flash Lamps
- 3) Xenon Short Arc Lamps (Standard Type)
- 4) Xenon Short Arc Lamps ((Shorter Type))
- 5) Xenon Short Arc lamps ((High-stabled Type)) and
Water-cooled Xenon Short Arc Lamps

Most of these attachment show Model names which are the ones of Ushio Electric. And on the column of Gas Pressure which are blank, I am now asking to have figures filled in..

APPENDIX B

OUTLINE OF GAS PRESSURE OF LAMPS

Type of lamps		Pressure not less than 280kPa	Sealed Substances	Remarks
Incandescent electric lamps		N/A	Inert Gas + Nitrogen Gas	
Halogen Lamps		Yes, on certain types	Inert Gas + very small amount of Halogen Compound	
For Use of Automobiles	Incandescent lamps	N/A	Inert Gas + Nitrogen Gas	
	Halogen Lamps	Yes, on certain types	Inert Gas + very small amount of Halogen Compound	
	HID (High Intensity Discharge Lamp)	Yes, on certain types	Inert Gas + Mercury or Without Mercury	
Fluorescent Lamps		N/A	Inert Gas + Mercury	
HID Lamps	Mercury lamps	Yes. on certain types	Inert Gas + Mercury	Lamps used for hardening of liquid crystal base..
	High-pressure Sodium Lamps	N/A	Inert Gas + Mercury + Metal Sodium	
	Metal Halide Lamps	N/A	Inert Gas + Mercury + Metal Halogen Compound	
Xenon Lamps		Yes, on certain lamps	Inert Gas (Xenon Gas)	

Remarks:

- 1) Some of Halogen Lamps containing Dibromomethane (UN 2664, Div. 6.1 PG III, Y611/2L, 611/60L, 618/220L).
- 2) Some of High-pressure Sodium Lamps containing Metal Sodium (Sodium UN 1428, Div.4.3 Dang. when wet, PG I, Forbidden 412/15kg).
- 3) Some of Metal Halide Lamps containing Thallium compound, n.o.s. (UN 1707, Div. 6.1 PG III, Y613/1 kg, 613/ 25kg, 615 /100kg).

APPENDIX C

XENON FLASH LAMPS

Model	Rated Voltage (v)	Rated Energy (J)	Wattage (w)	Gas Pressure (MPa)	Life (repetitious)	Bulb length (mm)	Arc length (mm)	Bulb Diameter (mm)	Remarks
FQ 502	1,500	292	5	0.22(220kPa)	10,000,000	567	502	15.5	Manufactures: Ushio Electric Matsushita Panasonic
FQ 50205	1,700	376	1.88kw (5Hz)	(28.6kPa)	15,000,000			13.0	
FQ 440	2,050	336	3	0.01(10kPa)	5,000,000	520	440	16.5	
FQ 44001			1kw(3Hz)	(39kPa)	5,800,000			13.0	
FQ 370	1,500	290	4.8	0.15	10,000,000	432	370	16.5	
FQ 37003			1.39kw	(150kPa) (52kPa)	15,000,000			13.0	

The above models are Ushio Electric's products.

Use of Xenon Flash Lamps :

1. **Image and information processing**
Copiers
Facsimiles
Computer output machine
2. **Photographing**
Strobe lights
High-speed photos
Microscopes
Other special photographing
3. **Signal generation**
Flash light signals
Marine-use signals
Automobiles
Emergency lights
4. **Irradiation**
Stroboscopes
Timing lights
Display
5. **Measurement of environmental pollution**
Analysis of SO₂, etc.
6. **Optical reactivity**
Drying ink and paint
Study of light reaction mechanism
7. **Others**
Medical treatment
Plant upbringing
Solar simulator
Solid laser excitation

APPENDIX D
XENON SHORT ARC LAMPS

STANDARD TYPE

Model	Rated Wattage (W)	Rated Current (A)	Operating Current Range(A)	Rated Voltage (V)	Gas Pressure (MPa)	Average Life (h)	Contents Capacity (mL)		Remarks
UXL-75D-O	75	5.0	4.8~6.2	15	4.5 (4500kPa)	400	0.5		
UXL-75X-O	75	5.4	4.6~5.4	14	4.5 (4500kPa)	400	0.5		
UXL-150D	135	7.5	7.0~8.0	18	2.0 (2000kPa)	1,500	2.5		
UXL-150D-S	135	7.5	7.0~8.0	18	2.0 (2000kPa)	1,500	2.5		
UXL-150D-O	135	7.5	7.0~8.0	18	2.0 (2000kPa)	1,500	2.5		
UXL-151D	150	7.5	7.0~8.0	20	2.0 (2000kPa)	1,500	2.5		
UXL-151D-O	150	7.5	7.0~8.0	20	2.0 (2000kPa)	1,500	2.5		
UXL-300D	300	15	14~16	20	2.0 (2000kPa)	1,000	6.0		
UXL-300D-O	300	15	14~16	20	2.0 (2000kPa)	1,000	6.0		
UXL-451-O	450	25	17~30	18	2.0 (2000kPa)	1,500	15.0		
UXL-500D	500	25	17~25	20	2.0 (2000kPa)	1,500	15.0		
UXL-500D-O	500	25	17~25	20	2.0 (2000kPa)	1,500	15.0		
UXL-900-O	900	45	30~50	20	1.2 (1200kPa)	1,500	45.0		
UXL-1000D	1,000	45	32~47	22	1.2 (1200kPa)	1,500	45.0		
UXL-1000D-O	1,000	45	32~47	22	1.2 (1200kPa)	1,500	45.0		
UXL-1000HK-O	900	45	32~47	20	1.2 (1200kPa)	1,500	45.0		
UXL-1600-O	1,560	65	45~65	24	1.0 (1000kPa)	1,500	100.0		
UXL-2003D-O	1,890	70	33~80	27	1.0 (1000kPa)	1,500	100.0		
UXL-2500-O	2,500	83	60~95	30	1.0 (1000kPa)	1,500	120.0		
UXL-3000-D-O	2,400	90	80~90	27	1.0 (1000kPa)	1,200	120.0		
UXL-3000HK-O	2,500	90	70~110	25	1.0 (1000kPa)	1,200	120.0		
UXL-3601HK-O	3,360	120	80~120	28	1.0 (1000kPa)	1,200	150.0		
UXL-5000DKB-O	4,200	140	100~140	30	1.0 (1000kPa)	600	150.0		
UXL-6000HK-O	5,000	155	120~160	32	1.0 (1000kPa)	600	150.0		

Features of Xenon Short Arc Lamps: (75W~30KW)

- 1 The spectrum of light is most likely that of the sun.
- 2 High intensity and point light source.
- 3 highly accurate optical control and good color representation properties

Use:

- 1 Large and high-quality projectors
- 2 High-intensity projectors with writeable LCDs
- 3 Spectrophotometers
- 4 Endoscopes
- 5 Image processing Pin spot Arc image furnace
 Solar simulators Fibre lighting device etc.
 Standard light source Planetarium
 Search lights Light solder

SHORTER TYPE

Model	Rated Wattage (W)	Rated Current (A)	Operating Current Range (A)	Rated Voltage (V)	Gas Pressure (MPa)	Average Life (h)	Contents Capacity (mL)		Remarks
UXL-5S	500	28	17~30	18	2.0 (2000kPa)	1500	20		
UXL-7S	700	37	30~45	19	1.5 (1500kPa)	1500	40		
UXL-7SC	700	37	30~45	19	1.5 (1500kPa)	1500	40		
UXL-10S	1000	50	30~55	20	1.5 (1500kPa)	1500	40		
UXL-10SC	1000	50	30~55	20	1.5 (1500kPa)	1500	40		
UXL-16S	1430	65	45~70	22	1.2 (1200kPa)	1500	70		
UXL-16SC	1430	65	45~70	22	1.2 (1200kPa)	1500	70		
UXL-25S	2500	90	70~100	28	1.0 (1000kPa)	1500	120		
UXL-25SC	2500	90	70~100	28	1.0 (1000kPa)	1500	120		
UXL-40SC	4000	135	80~150	29	1.0 (1000kPa)	800	200		

HIGHLY-STABLED TYPE

Model	Rated Wattage (W)	Rated Current (A)	Operating Current Range (A)	Rated Voltage (V)	Gas Pressure (MPa)	Average Life (h)	Contents Capacity (mL)		Remarks
UXL-S75	75	5.4	4.6~5.4	15	4.5 (4500 kPa)		0.5		
UXL-S150	150	8.5	8~9	17.5	2.0 (2000 kPa)	3000	2.5		
UXL-S151	150	7.5	7~8	20	2.0 (2000 kPa)	3000	2.5		

WATER-COOLED XENON SHORT ARC LAMPS

Model	Rated Wattage (W)	Rated Current (A)	Operating Current Range (A)	Rated Voltage (V)	Gas Pressure (MPa)	Average Life (h)	Contents Capacity (mL)	Length (mm)	
UXW-25000F	25000	550			0.5 (500kPa)	400	1200		
UXW-15KD	15000	400			0.5 (500kPa)		900		

APPENDIX E
HALOGEN LAMPS

Halogen Lamps (Typical types)

Item	Lamp	JD 85W Single-ended (w/Infrared rays mirror)	Reflecting Mirror Type JR50W (w/All-glass)	Vehicles Lamps 60/55W (Hard-glass made H4)	Material used	
Mass of Each Component	1	Glass Tube (g)	2.9	1.4	6.2	Quartz glass (SiO ₂) is used. Hard glass (borosilicate glass) only for vehicles lamps.
	2	Mounting Parts (g)	0.3	0.4	1.0	Tungsten (W) for filament, Molybdenum (Mo) for lead wire, Quartz glass for stem glass.
	3	Sealed Gas (MPa)	0.2 ~ 0.6 MPa (200kPa ~600kPa)			Inert gas (argon, xenon, nitrogen, etc.) and very small amount of halogen compound are sealed.
	4	Mirror (Dichroic) (g)	—	29.9	—	Borosilicate-glass made mirror in an oval and paraboloid shape. Interference film(ZnS-MgF ₂) transmitting infrared rays is formed inside.
	5	Metal Cap (g)	5.8	—	17.2	Mainly ceramics,brass and nickel plating used for the metal cap. Epoxy resin and stainless for vehicles lamps.
	6	Adhesive(Cement)(g)	0.7	1.1	—	Inorganic cement mainly composed of alumina and silica.
Total mass of the lamp (g)		10.0	33.0	25.0		
Standard dimension of the lamp	Max. diameter (mm)		15.5	50.0	43.0	
	Max. length (mm)		75.0	43.0	92.0	