

# ULTRAVIOLET (UV) DISINFECTION EQUIPMENT: MAJOR APPLICATIONS AND GLOBAL MARKETS



IAS037B  
August 2013

Susan Hanft  
*Project Analyst*

ISBN: 1-56965-517-0

**bcc** | Research  
Market Forecasting

**BCC Research**  
49 Walnut Park, Building 2  
Wellesley, MA 02481  
866-285-7215, 781-489-7301  
[www.bccresearch.com](http://www.bccresearch.com)  
Custom Reports:  
[carol.laverty@bccresearch.com](mailto:carol.laverty@bccresearch.com)

**TABLE OF CONTENTS**

<b>TOPIC</b>	<b>PAGE NO.</b>
CHAPTER 1 INTRODUCTION	2
STUDY GOALS AND OBJECTIVES	2
REASONS FOR DOING THE STUDY	2
INTENDED AUDIENCE	2
SCOPE AND FORMAT OF REPORT	3
METHODOLOGY	3
INFORMATION SOURCES	3
ANALYST CREDENTIALS	4
RELATED BCC REPORTS	4
BCC ONLINE SERVICES	4
DISCLAIMER	4
CHAPTER 2 EXECUTIVE SUMMARY	6
<i>SUMMARY TABLE MARKET SIZE AND GROWTH FOR UV DISINFECTION EQUIPMENT BY END USE, THROUGH 2018 (\$ MILLIONS)</i>	9
<i>SUMMARY FIGURE MARKET SIZE AND GROWTH FOR UV DISINFECTION EQUIPMENT BY END USE, 2000-2018 (\$ MILLIONS)</i>	9
CHAPTER 3 OVERVIEW	11
<i>TABLE 1 CATEGORIES OF UV LIGHT</i>	11
<i>TABLE 2 A BRIEF TIMELINE OF UV TECHNOLOGY</i>	12
APPLICATIONS FOR UV	13
<i>TABLE 3 APPLICATIONS FOR UV</i>	13
FACTORS DRIVING GROWTH OF THE UV EQUIPMENT MARKET	13
UV EQUIPMENT	14
UV LAMPS	14
<i>TABLE 4 UV LAMP TYPES</i>	15
Mercury Vapor Lamps	15
Low-Pressure Mercury UV Lamps	16
Low-Pressure, High-Output Lamps	16
Medium-Pressure Mercury UV Lamps	17
<i>TABLE 5 TYPICAL CHARACTERISTICS OF MERCURY UV LAMPS</i>	17
Metal Halide Lamps	18
Xenon Lamps	18
Excimer Lamps	18
LEDs	18
LAMP BALLASTS	19
<i>TABLE 6 COMPARISON OF MAGNETIC AND ELECTRONIC BALLASTS</i>	19
LAMP SLEEVES	20
CLEANING SYSTEMS	21
SENSORS	21
UVT ANALYZERS	22
OTHER	22
REACTORS	22
Lamp Configuration	23
Water Flow	23

<b>TOPIC</b>	<b>PAGE NO.</b>
HOW UV WORKS	24
DOSAGE	24
<i>TABLE 7 UV DOSAGE REQUIRED FOR 99.9% DISINFECTION OF VARIOUS BACTERIA (MICROWATTS-S/CM2 AT 254 NM)</i>	25
<i>TABLE 8 UV DOSAGE REQUIRED FOR 99.9% DISINFECTION OF VARIOUS MOLD SPORES (MICROWATTS-S/CM2 AT 254 NM)</i>	26
<i>TABLE 9 UV DOSAGE REQUIRED FOR 99.9% DISINFECTION OF VARIOUS PROTOZOA AND ALGAE (MICROWATTS-S/CM2 AT 254 NM)</i>	27
<i>TABLE 10 UV DOSAGE REQUIRED FOR 99.9% DISINFECTION OF VARIOUS VIRUSES (MICROWATTS-S/CM2 AT 254 NM)</i>	27
<i>TABLE 11 UV DOSAGE REQUIRED FOR 99.9% DISINFECTION OF VARIOUS YEASTS (MICROWATTS-S/CM2 AT 254 NM)</i>	27
MAINTENANCE REQUIREMENTS FOR UV UNITS	28
LAMP CLEANING AND REPLACEMENT	28
PERFORMANCE MONITORING	28
CHAPTER 4 TRENDS AND TECHNICAL DEVELOPMENTS	31
MICROWAVE UV LAMPS	31
ADVANTAGES	32
DISADVANTAGES	32
LED LAMPS	33
ADVANCED OXIDATION PROCESSES (AOPS)	33
ADVANTAGES AND DRAWBACKS OF AOPS	34
PULSED UV	35
APPLICATIONS OF PULSED UV	35
R&D	36
Surface Treatment	36
Water, Wastewater and Other Liquids	36
Air	36
BALLAST WATER DISINFECTION	37
<i>TABLE 12 IMO STANDARDS FOR DISCHARGED BALLAST WATER</i>	37
EMERGING CONTAMINANTS	38
UV AOPS FOR EC DESTRUCTION	38
<i>TABLE 13 OXIDATION POTENTIALS OF COMMON OXIDANTS USED IN WATER TREATMENT</i>	39
PATENT SURVEY	40
BY APPLICATION	40
<i>TABLE 14 PATENTS BY APPLICATION (NUMBER, %)</i>	42
<i>FIGURE 1 PATENTS BY APPLICATION (NUMBER/%)</i>	42
BY COMPANY	43
<i>TABLE 15 PATENTS BY COMPANY (NUMBER, %)</i>	45
<i>FIGURE 2 PATENTS BY COMPANY (NO/%)</i>	45
CHAPTER 5 WATER TREATMENT	47
MUNICIPAL WATER TREATMENT MARKET SIZE AND GROWTH	47
RESIDENTIAL WATER TREATMENT MARKET SIZE AND GROWTH	49
PROCESS WATER TREATMENT MARKET SIZE AND GROWTH	50
SEMICONDUCTOR PROCESS WATER TREATMENT	50
PHARMACEUTICAL PROCESS WATER TREATMENT	51

<b>TOPIC</b>	<b>PAGE NO.</b>
COMMERCIAL WATER TREATMENT	53
POOL AND SPA	53
AQUACULTURE, AGRICULTURE	54
OTHER	54
<i>TABLE 16 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN WATER TREATMENT, THROUGH 2018 (\$ MILLIONS)</i>	55
<i>FIGURE 3 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN WATER TREATMENT, 2000-2018 (\$ MILLIONS)</i>	55
OVERVIEW	56
MUNICIPAL DRINKING WATER TREATMENT	56
UV Lamps	57
Reactor Types	57
Benefits and Drawbacks	58
Cost, Effectiveness of UV Irradiation	58
<i>TABLE 17 TYPICAL UV SYSTEM SPECS (10 MGD INSTALLATION)</i>	58
RESIDENTIAL WATER TREATMENT	59
Residential UV Equipment	59
COMMERCIAL WATER TREATMENT	60
POOL AND SPA WATER TREATMENT	61
WATER FOR AGRICULTURE, AQUACULTURE	62
PROCESS WATER TREATMENT	62
Compendial Water	62
ULTRAPURE MICROELECTRONICS-GRADE WATER	63
OTHER PROCESS WATER	64
CHAPTER 6 WASTEWATER TREATMENT	66
WASTEWATER TREATMENT	66
WASTEWATER REUSE	66
EMERGING CONTAMINANTS	67
<i>TABLE 18 MARKET SIZE AND GROWTH OF THE UV EQUIPMENT IN WASTEWATER TREATMENT, THROUGH 2018 (\$ MILLIONS)</i>	68
<i>FIGURE 4 MARKET SIZE AND GROWTH OF THE UV EQUIPMENT IN WASTEWATER TREATMENT, 2000-2018 (\$ MILLIONS)</i>	68
OVERVIEW	68
WASTEWATER TREATMENT	68
Primary, Secondary and Tertiary Treatment	69
WASTEWATER REUSE	69
LOW-QUALITY WASTEWATER DISINFECTION	70
<i>TABLE 19 UV TRANSMISSION WITH VARIOUS WATER TYPES (%)</i>	71
SSOs, CSOs and Blended Effluent	71
Stormwater	72
BENEFITS AND DRAWBACKS OF UV IN WASTEWATER TREATMENT	72
UV EQUIPMENT	72
CHAPTER 7 FOOD AND BEVERAGE DISINFECTION	75
<i>TABLE 20 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN THE FOOD AND BEVERAGE INDUSTRY, THROUGH 2018 (\$ MILLIONS)</i>	77
<i>FIGURE 5 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN THE FOOD AND BEVERAGE INDUSTRY, 2000-2018 (\$ MILLIONS)</i>	77

<b>TOPIC</b>	<b>PAGE NO.</b>
OVERVIEW	78
<i>TABLE 21 APPLICATIONS FOR UV IN THE FOOD INDUSTRY</i>	78
ADVANTAGES AND DISADVANTAGES OF UV IN THE FOOD AND BEVERAGE SECTOR	78
BOTTLED WATER AND OTHER BEVERAGES	79
Process Water Reuse	79
Flavoring Syrups	80
MARINADES AND BRINES	80
SURFACE DISINFECTION OF FOODS	80
Meat, Poultry and Seafood	81
Eggshells	81
Milk	82
Produce	82
SURFACE DISINFECTION OF PRODUCTION AREAS, EQUIPMENT AND PACKAGING	83
CHAPTER 8 AIR TREATMENT	85
<i>TABLE 22 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN AIR TREATMENT, THROUGH 2018 (\$ MILLIONS)</i>	87
<i>FIGURE 6 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN AIR TREATMENT, 2000-2018 (\$ MILLIONS)</i>	87
OVERVIEW	87
INDOOR AIR POLLUTION	88
<i>TABLE 23 INDOOR AIR POLLUTANTS</i>	88
UV EQUIPMENT FOR INDOOR AIR TREATMENT	89
<i>TABLE 24 UVGI SYSTEM TYPES</i>	89
UVGI LAMP TYPES	91
Configuration	91
APPLICATIONS FOR UV AIR DISINFECTION	91
HOSPITALS	92
<i>TABLE 25 NOSOCOMIAL AGENTS WITH POTENTIAL FOR AIRBORNE TRANSMISSION</i>	93
RESIDENTIAL AND COMMERCIAL	94
CLEANROOMS	94
ELECTRIC UTILITIES	95
TRANSPORTATION	95
BIOTERROR AGENTS	96
CHAPTER 9 SURFACE DISINFECTION	98
<i>TABLE 26 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN SURFACE DISINFECTION, THROUGH 2018 (\$ MILLIONS)</i>	99
<i>FIGURE 7 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN SURFACE DISINFECTION, 2000-2018 (\$ MILLIONS)</i>	99
OVERVIEW	99
APPLICATIONS	100
<i>TABLE 27 APPLICATIONS FOR UV IN SURFACE DISINFECTION</i>	101
Healthcare	101
Medical and Dental Equipment Sterilization	101
Operating Theaters	101
Catheter Access Sites	102

<b>TOPIC</b>	<b>PAGE NO.</b>
HVAC Cooling Coils and Drain Pans	102
Mold Inhibition and Remediation	103
Small Appliances	104
<b>CHAPTER 10 UV MARKET BY WORLD REGION</b>	106
<i>TABLE 28 MARKET SIZE AND GROWTH FOR UV EQUIPMENT BY WORLD REGION, THROUGH 2018 (\$ MILLIONS)</i>	106
<i>FIGURE 8 MARKET SIZE AND GROWTH FOR UV EQUIPMENT BY WORLD REGION, 2000-2018 (\$ MILLIONS)</i>	106
<b>MARKET SIZE AND GROWTH FOR UV DISINFECTION EQUIPMENT IN NORTH AMERICA</b>	107
<i>TABLE 29 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN NORTH AMERICA, THROUGH 2018 (\$ MILLIONS)</i>	108
<i>FIGURE 9 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN NORTH AMERICA, 2000-2018 (\$ MILLIONS)</i>	108
<b>U.S.</b>	109
Water and Wastewater Treatment	110
Infrastructure Needs	110
Drinking Water	110
Wastewater	112
NSF International	113
<i>TABLE 30 NSF STANDARDS</i>	113
Process Water	114
Pharmaceuticals Production	114
Semiconductor Manufacturing	115
Food and Beverage	116
Air and Surface	117
<b>CANADA</b>	118
Water and Wastewater	119
Process Water	119
Food and Beverage	120
Air and Surface	120
<b>MEXICO</b>	121
Water and Wastewater	121
Process Water	122
Food and Beverage	123
Air and Surface	123
<b>MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN EUROPE</b>	124
<b>WATER TREATMENT</b>	125
Process Water	125
Wastewater	126
Food and Beverage	127
Air and Surface	127
<i>TABLE 31 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN EUROPE THROUGH 2018 (\$ MILLIONS)</i>	128
<i>FIGURE 10 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN EUROPE 2000-2018 (\$ MILLIONS)</i>	128
<b>FRANCE</b>	129
Water and Wastewater	129

<b>TOPIC</b>	<b>PAGE NO.</b>
Process Water	129
Pharmaceuticals Production	130
Semiconductor Manufacturing	130
Food and Beverage	130
Air and Surface	131
<b>GERMANY</b>	131
Water and Wastewater	132
Process Water	132
Pharmaceuticals Production	133
Semiconductor Manufacturing	133
Food and Beverage	134
Air and Surface	134
<b>ITALY</b>	135
Water and Wastewater	135
Process Water	136
Pharmaceuticals Production	136
Semiconductor Manufacturing	136
Food and Beverage	137
Air and Surface	137
<b>IRELAND</b>	137
Water and Wastewater	138
Process Water	139
Pharmaceuticals Production	139
Semiconductor Manufacturing	139
Food and Beverage	140
Air and Surface	140
<b>SPAIN</b>	141
Water and Wastewater	141
Food and Beverage	142
Air and Surface	142
<b>U.K.</b>	143
Water and Wastewater	143
Process Water	144
Pharmaceuticals Production	144
Semiconductor Manufacturing	145
Food and Beverage	145
Air and Surface	146
<b>MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN THE ASIA-PACIFIC REGION</b>	146
<b>WATER TREATMENT</b>	146
Residential Water Treatment	147
Process Water Treatment	147
Wastewater Treatment	148
Food and Beverage	149
Air and Surface	149
<i>TABLE 32 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN THE ASIA-PACIFIC REGION, THROUGH 2018 (\$ MILLIONS)</i>	150
<i>FIGURE 11 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN THE ASIA-PACIFIC REGION, 2000-2018 (\$ MILLIONS)</i>	150

<b>TOPIC</b>	<b>PAGE NO.</b>
AUSTRALIA	150
Water and Wastewater	151
Process Water	152
Food and Beverage	153
Air and Surface	153
CHINA	154
Water and Wastewater	155
Process Water	156
Pharmaceuticals Production	156
Semiconductor Manufacturing	157
Food and Beverage	157
Air and Surface	158
INDIA	159
Water and Wastewater	159
Process Water	160
Pharmaceuticals Production	161
Semiconductor Manufacturing	161
Food and Beverage	162
Air and Surface	163
JAPAN	163
Water and Wastewater	164
Process Water	165
Pharmaceuticals Production	165
Semiconductor Manufacturing	165
Food and Beverage	166
Air and Surface	166
KOREA	167
Water and Wastewater	167
Process Water	168
Pharmaceuticals Production	168
Semiconductor Manufacturing	169
Food and Beverage	169
Air and Surface	170
SINGAPORE	170
Water and Wastewater	170
Process Water	171
Pharmaceuticals Production	171
Semiconductor Manufacturing	171
Food and Beverage	172
Air and Surface	172
MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN THE REST OF THE WORLD	173
<i>TABLE 33 MARKET SIZE AND GROWTH FOR UV DISINFECTION EQUIPMENT IN REST OF WORLD, THROUGH 2018 (\$ MILLIONS)</i>	174
<i>FIGURE 12 MARKET SIZE AND GROWTH FOR UV DISINFECTION EQUIPMENT IN REST OF WORLD, 2000-2018 (\$ MILLIONS)</i>	174
CHAPTER 11 INDUSTRY STRUCTURE	177



<b>TOPIC</b>	<b>PAGE NO.</b>
<i>TABLE 34 TOTAL GLOBAL WATER MARKET REVENUES, BY SECTOR, THROUGH 2018 (\$ BILLIONS, 2012)</i>	179
COMPANY PROFILES	179
ABIOTEC UV TECHNOLOGY	180
ADVANCED UV, INC.	180
AIR OASIS	181
AIRWISE	181
ALFA LAVAL	181
ALLERAIR INDUSTRIES	182
AMERICAN AIR & WATER	182
AMERICAN ULTRAVIOLET	183
AQUIONICS	183
Municipal Drinking Water Systems	184
Municipal Wastewater Systems	184
Industrial Systems	184
ATLANTIC ULTRAVIOLET CORP.	185
ATLANTIUM TECHNOLOGY LTD.	185
AUSTRALIAN ULTRA VIOLET SERVICES (OPERATIONS) PTY LTD.	186
BIO-UV	186
CALGON CARBON CORP.	187
Calgon Carbon Systems	187
Wastewater Treatment Systems	188
CARRIER CORP.	188
CLEAN WATER SYSTEMS INTERNATIONAL (CWS)	188
CULLIGAN INTERNATIONAL	189
DIEAU-EDAFIM	189
DUST FREE	190
EMPEROR AQUATICS INC.	190
ENGINEERED TREATMENT SYSTEMS (ETS)	191
ESPRING	191
ETA PLUS ELECTRONIC GMBH	192
EUREKA FORBES LTD.	192
FIRST LIGHT TECHNOLOGIES, INC.	193
GE LIGHTING	193
GERMITEC	193
GREENWAY WATER TECHNOLOGIES	194
HERAEUS NOBLELIGHT	194
Heraeus Systems	195
HYDRO-PHOTON INC.	195
LIGHT PROGRESS	195
LIGHT SOURCES, INC.	196
LIT TECHNOLOGY	196
LIT systems	197
LUMALIER CORPORATION	197
MAESTRO PRESSURE COOLERS	198
MERIDIAN DESIGN, INC.	198
NATURE FLOW SYSTEMS PTY. LTD,	199
NEOTEC UV	199

<b>TOPIC</b>	<b>PAGE NO.</b>
Neotec Systems	200
OZONIA NORTH AMERICA	200
Aquaray Systems	200
PANASIA CO., LTD.	201
PHILIPS	201
REMOTE LIGHT, INC. (RLI)	202
SENTRY ULTRAVIOLET, INC.	202
SEVERN TRENT SERVICES	203
UltraDynamics Systems	203
MicroDynamics Systems	203
SIEMENS AG	204
Osram	204
SIEMENS WATER TECHNOLOGIES	204
Siemens Drinking Water Systems	205
Siemens Process Water Systems	205
SITA SRL	205
ULTRAAQUA	206
Ultraaqua Systems	206
SUREPURE	207
STERIBEAM SYSTEMS GMBH	207
STERIL-AIRE INC.	207
Steril-Aire Systems	208
SVAROG	208
TROJAN UV	209
Drinking Water Systems	209
Wastewater Systems	210
Environmental Contaminant Treatment Systems	210
Aquafine	210
Viqua	211
Trojan Marinex	211
ULTRA-SUN TECHNOLOGIES, INC.	212
ULTRAVIOLET DEVICES INC. (UVDI)	212
USHIO, INC.	212
UV DYNAMICS	213
UV PURE	213
UV-TECHNIK	214
WATERHEALTH INTERNATIONAL	214
WATERLOGIC INTERNATIONAL	215
Waterlogic Systems	215
WEDECO	216
Wedeco Lamps	216
Drinking Water Systems	216
Wastewater Systems	217
WARTSILA	217
WONDER LIGHT INDUSTRY MACHINERY ELECTRONIC PRODUCTS	218
XENON CORP.	218

<b>TOPIC</b>	<b>PAGE NO.</b>
CHAPTER 12 APPENDIX	220
<i>TABLE 35 PATENT SURVEY (JULY 1, 2003 TO JUNE 30, 2013)</i>	220

**LIST OF TABLES**

<b>TABLE HEADING</b>	<b>PAGE NO.</b>
SUMMARY TABLE MARKET SIZE AND GROWTH FOR UV DISINFECTION EQUIPMENT BY END USE, THROUGH 2018 (\$ MILLIONS)	9
TABLE 1 CATEGORIES OF UV LIGHT	11
TABLE 2 A BRIEF TIMELINE OF UV TECHNOLOGY	12
TABLE 3 APPLICATIONS FOR UV	13
TABLE 4 UV LAMP TYPES	15
TABLE 5 TYPICAL CHARACTERISTICS OF MERCURY UV LAMPS	17
TABLE 6 COMPARISON OF MAGNETIC AND ELECTRONIC BALLASTS	19
TABLE 7 UV DOSAGE REQUIRED FOR 99.9% DISINFECTION OF VARIOUS BACTERIA (MICROWATTS-S/CM2 AT 254 NM)	25
TABLE 8 UV DOSAGE REQUIRED FOR 99.9% DISINFECTION OF VARIOUS MOLD SPORES (MICROWATTS-S/CM2 AT 254 NM)	26
TABLE 9 UV DOSAGE REQUIRED FOR 99.9% DISINFECTION OF VARIOUS PROTOZOA AND ALGAE (MICROWATTS-S/CM2 AT 254 NM)	27
TABLE 10 UV DOSAGE REQUIRED FOR 99.9% DISINFECTION OF VARIOUS VIRUSES (MICROWATTS-S/CM2 AT 254 NM)	27
TABLE 11 UV DOSAGE REQUIRED FOR 99.9% DISINFECTION OF VARIOUS YEASTS (MICROWATTS-S/CM2 AT 254 NM)	27
TABLE 12 IMO STANDARDS FOR DISCHARGED BALLAST WATER	37
TABLE 13 OXIDATION POTENTIALS OF COMMON OXIDANTS USED IN WATER TREATMENT	39
TABLE 14 PATENTS BY APPLICATION (NUMBER, %)	42
TABLE 15 PATENTS BY COMPANY (NUMBER, %)	45
TABLE 16 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN WATER TREATMENT, THROUGH 2018 (\$ MILLIONS)	55
TABLE 17 TYPICAL UV SYSTEM SPECS (10 MGD INSTALLATION)	58
TABLE 18 MARKET SIZE AND GROWTH OF THE UV EQUIPMENT IN WASTEWATER TREATMENT, THROUGH 2018 (\$ MILLIONS)	68
TABLE 19 UV TRANSMISSION WITH VARIOUS WATER TYPES (%)	71
TABLE 20 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN THE FOOD AND BEVERAGE INDUSTRY, THROUGH 2018 (\$ MILLIONS)	77
TABLE 21 APPLICATIONS FOR UV IN THE FOOD INDUSTRY	78
TABLE 22 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN AIR TREATMENT, THROUGH 2018 (\$ MILLIONS)	87
TABLE 23 INDOOR AIR POLLUTANTS	88
TABLE 24 UVGI SYSTEM TYPES	89
TABLE 25 NOSOCOMIAL AGENTS WITH POTENTIAL FOR AIRBORNE TRANSMISSION	93
TABLE 26 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN SURFACE DISINFECTION, THROUGH 2018 (\$ MILLIONS)	99
TABLE 27 APPLICATIONS FOR UV IN SURFACE DISINFECTION	101
TABLE 28 MARKET SIZE AND GROWTH FOR UV EQUIPMENT BY WORLD REGION, THROUGH 2018 (\$ MILLIONS)	106
TABLE 29 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN NORTH AMERICA, THROUGH 2018 (\$ MILLIONS)	108
TABLE 30 NSF STANDARDS	113
TABLE 31 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN EUROPE THROUGH 2018 (\$ MILLIONS)	128
TABLE 32 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN THE ASIA-PACIFIC REGION, THROUGH 2018 (\$ MILLIONS)	150

<b>TABLE HEADING</b>	<b>PAGE NO.</b>
TABLE 33 MARKET SIZE AND GROWTH FOR UV DISINFECTION EQUIPMENT IN REST OF WORLD, THROUGH 2018 (\$ MILLIONS)	174
TABLE 34 TOTAL GLOBAL WATER MARKET REVENUES, BY SECTOR, THROUGH 2018 (\$ BILLIONS, 2012)	179
TABLE 35 PATENT SURVEY (JULY 1, 2003 TO JUNE 30, 2013)	220

**LIST OF FIGURES**

<b>FIGURE TITLE</b>	<b>PAGE NO.</b>
SUMMARY FIGURE MARKET SIZE AND GROWTH FOR UV DISINFECTION EQUIPMENT BY END USE, 2000-2018 (\$ MILLIONS)	9
FIGURE 1 PATENTS BY APPLICATION (NUMBER/%)	42
FIGURE 2 PATENTS BY COMPANY (NO/%)	45
FIGURE 3 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN WATER TREATMENT, 2000-2018 (\$ MILLIONS)	55
FIGURE 4 MARKET SIZE AND GROWTH OF THE UV EQUIPMENT IN WASTEWATER TREATMENT, 2000-2018 (\$ MILLIONS)	68
FIGURE 5 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN THE FOOD AND BEVERAGE INDUSTRY, 2000-2018 (\$ MILLIONS)	77
FIGURE 6 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN AIR TREATMENT, 2000-2018 (\$ MILLIONS)	87
FIGURE 7 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN SURFACE DISINFECTION, 2000-2018 (\$ MILLIONS)	99
FIGURE 8 MARKET SIZE AND GROWTH FOR UV EQUIPMENT BY WORLD REGION, 2000-2018 (\$ MILLIONS)	106
FIGURE 9 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN NORTH AMERICA, 2000-2018 (\$ MILLIONS)	108
FIGURE 10 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN EUROPE 2000-2018 (\$ MILLIONS)	128
FIGURE 11 MARKET SIZE AND GROWTH FOR UV EQUIPMENT IN THE ASIA-PACIFIC REGION, 2000-2018 (\$ MILLIONS)	150
FIGURE 12 MARKET SIZE AND GROWTH FOR UV DISINFECTION EQUIPMENT IN REST OF WORLD, 2000-2018 (\$ MILLIONS)	174