

Resources for Exhibit Safety

This resource list complements the article “Keeping Visitors Safe Around Exhibits,” by Kathy Krafft and Harry White, which appeared in the January/February 2014 issue of Dimensions magazine, published by the Association of Science-Technology Centers, www.astc.org.

Safety Products

- Public playground inspection kit to help identify “head entrapments” where a child’s body might fit but their head could get stuck and “protrusion hazards” that could damage a child’s eye. Available for \$240 at www.mindspring.com/~safetyplay/tools.htm



- No-choke testing tube (www.cpsc.gov/BUSINFO/regsumsmallparts.pdf) to determine if an object is small enough to be considered a choking hazard for children under 3 years old. These testing tubes are made by Safety 1st and Toys to Grow On, among others, and can be purchased for about \$3.



- Articulated finger test probe (ewh.ieee.org/soc/pses/Downloads/newsletters/97v10n2.pdf, pp. 12–16, made to meet Underwriters Laboratories’ ULP04 test standard) to simulate a human finger and ensure that adults and children cannot stick their fingers into openings and get pinched or sheared or come into contact with any live electrical parts. Available for \$350 at www.mindspring.com/~safetyplay/tools.htm. You can also just use common sense and keep gaps under about 1/8 inch (0.3175 cm) and electrical components far out of reach. Also, you can use a small carrot to check for pinch or shear hazards, although the size is certainly not standardized.



Web resources

- Safety in Theaters
www.artscraftstheatersafety.org/
- Smithsonian Accessibility Guidelines
accessible.si.edu/pdf/Smithsonian%20Guidelines%20for%20accessible%20design.pdf

Print resources

- American Institute of Architects. (2007). *Architectural graphic standards* (11th ed.). New York, NY: John Wiley & Sons.
- Callanan, M., & Wusinich, B. (2008). *Electrical systems based on the 2008 NEC National Electrical Code*. Orland Park, IL: American Technical Publishers.
- Hawks, C., McCann, M., Makos, K., Goldberg, L., Hinkamp, D., Ertel, D., & Silence, P. (Eds.). (2011). *Health and safety for museum professionals*. New York, NY: Society for the Preservation of Natural History Collections and the Health & Safety Committee of the American Institute for Conservation of Historic and Artistic Works.
- Horowitz, P., & Hill, W. (1989). *The art of electronics*. Cambridge, UK: Cambridge University Press.
- Howie, F. (Ed.). (1987). *Safety in museums and galleries*. London: Butterworth-Heinemann. (Out of print, available used.)
- Kennedy, J. (1990). *User-friendly: Hands-on exhibits that work*. Washington, DC: Association of Science-Technology Centers.
- Kervill, G. (1998). *Practical guide to the low voltage directive*. Oxford, UK: Newnes.
- Rockis, G., & Mazur, G. (2001). *Electrical motor controls*. Orland Park, IL: American Technical Publishers.
- Tilley, A.R., & Henry Dreyfuss Associates. (2001). *The measure of man and woman: Human factors in design* (revised). New York, NY: John Wiley & Sons.

Safety Resources for the United States

| Acronym | Full name and website | Standards or certification |
|--------------------|--|--|
| ADA | Americans with Disabilities Act www.ada.gov | ADA Standards for Accessible Design has a number of helpful guidelines for ramps, protrusions, aisle widths, print materials, etc. |
| ASTM International | Formerly the American Society for Testing and Materials www.astm.org | --F1487-01 Standard Consumer Safety Performance Specification for Playground Equipment for Public Use. --F1918-04 Standard Safety Performance Specification for Soft Contained Play Equipment. --F2373-08 Standard Consumer Safety Performance for Public Use Play Equipment for Children 6 months through 23 months. --WK1074 Standard Practice for Manufacture, Construction, Operations, Maintenance, and Water Quality of Interactive Aquatic Play Equipment. (About \$70 each.) |
| CPSC | Consumer Product Safety Commission www.cpsc.gov/PageFiles/122149/325.pdf www.cpsc.gov | <i>Handbook for Public Playground Safety.</i> (Free download.) Other publications and updates about toys, tools, and furniture. |

Safety Resources for the United States

| | | |
|------|---|--|
| MSDS | Material Safety Data Sheets www.ilpi.com/MSDS/faq/index.html is one reference; there are many on the internet. | Material Safety Data Sheets are required in the United States for any chemicals or hazardous substances in your facility. You'll sometimes get them automatically; you'll sometimes need to find the information. They cover handling, first aid, physical data, storage, disposal, etc. |
| NFPA | National Fire Prevention Association www.nfpa.org | NFPA 70-NEC National Electric Code (\$85 for the 1,000-page book). NFPA 101 Life Safety Code. |
| NRPA | National Recreation and Parks Association www.nrpa.org | Certified Playground Safety Inspector (CPSI) classes (\$400–500) and test (\$100). |
| OSHA | Occupational Safety and Health Administration www.osha.gov/dcsp | OSHA—part 1926 Safety and Health Regulations for Construction. (Free download.) |
| OSHA | Occupational Safety and Health Administration www.osha.gov/dcsp/smallbusiness/consult.html | OSHA has a free consultation branch, separate from the enforcement branch; these services do not result in penalties or citations. The business is obligated to correct any serious violations. |
| SI | Smithsonian Institution accessibility resources museumstudies.si.edu/header6.html | Compilation by the Smithsonian Institution, with links to the ASTC website and others. Smithsonian Accessible Exhibit Design is very helpful, with graphics, images, and guidelines. |

Safety Resources for the United States

| | | |
|----|---|---|
| UL | Underwriters Laboratories Inc. www.ul.com/global/eng/pages/ | <p>--UL #22 Standard for Amusement & Gaming Equipment (which has been used for UL "field evaluations" and should also be followed for permanent exhibitions).</p> <p>--UL Standard #508 for Industrial Control Equipment.</p> <p>--UL #2305 Standard for Safety for Exhibition Display Units, Fabrication, and Installation.</p> <p>(Each is about \$630 online.)</p> |
| | Local regulatory agencies, such as fire departments, county environmental departments, pollution control agencies, health departments | Establish a good working relationship with these agencies and utilize their expertise. |
| | Insurance companies | Their loss prevention/loss control departments will likely offer assistance with safety audits, surveys, industrial hygiene sampling, safety committee meetings, trainings, etc. |
| | Local universities | They have great environmental, health, and safety resources and expertise you can draw upon. |

Safety Resources for the European Union

Goods traded within the European Economic Community (EEC), which includes the European Union (EU) plus the countries of the European Free Trade Association (EFTA), have to be marked with a CE Mark (right) to show that they comply with the relevant safety standards. It is the responsibility of the manufacturer to check that the goods comply, to maintain the required documentation, and to add the mark.



Useful guidance is available here: www.gov.uk/ce-marking.

There is some dispute over whether CE marking is mandatory for science center exhibits with some commercial fabricators maintaining that it is not. However, whether it is compulsory or not, the standards, documents, and procedures laid down in the regulations show good practice and are worth following. Some, but not all, of the most relevant ones for exhibits are listed here:

Require CE marking according to EU Directive 93/68/EEC (1993)

- 98/37/EC: European Machinery Directive
- 73/23/EEC: European Low Voltage Directive
- 89/336/EEC: European EMC Directive
- 88/378/EEC: European Toy Safety Directive
- PM 19: Use of lasers for display purposes.

Sample Accident Report Form

From the Sciencenter, Ithaca, New York

FIRST AID REPORT

CONTACT INFORMATION

| | | |
|-------------------------|-------------------------|---------------------|
| Date | Time | |
| Patient Name | Age | Sciencenter Member? |
| Parent/Guardian Name | Relationship to Patient | |
| Parent/Guardian Address | | |
| City, State Zip | | |
| Phone Number | | |

INCIDENT REPORT

Location of incident

Patient's condition and/or injury:

How injured?

Care provided:

RESOLUTION

Cared for and released Sent home Refused Care

9-1-1 Called? Y or N Transport to hospital? Y or N or Refused Transported by whom?

Patient's Signature

Parent's Signature

First Aid Provider

Please make a copy of the report and place original in mailbox, the copy in mailbox.

Exhibit Risk Assessment Procedure

From At-Bristol, England, United Kingdom

The important thing is to show that you have given “due diligence” in assessing risk by establishing an objective scale against which you can show that the steps that you have taken have reduced the risk to an acceptable level.

So we have to define the scales of probability and severity as objectively as possible.

1. Specify probability of risk (How often)
 - a. Very unlikely
 - b. Unlikely
 - c. Even chance
 - d. Probable
 - e. Very likely
 - f. Certain
2. Specify Maximum Possible Loss (Severity)
 - a. No loss
 - b. First aid required/short rest/recovery
 - c. Fracture of major bone or mild temporary illness
 - d. Loss of limb, eye, or permanent illness
 - e. Fatality
3. Use the Risk Assessment Matrix to derive a numerical assessment of the risk.
4. Use the “Frequency of Exposure” matrix to determine a timescale for action.
5. Take action to reduce the level of risk to “Low” and reassess.
6. Document all stages of this procedure.
7. Update annually or whenever an exhibit is moved.
8. Link your institution’s accident reporting to your exhibit maintenance records so that persistent problems are highlighted.

Risk Assessment Matrix

From At-Bristol, England, United Kingdom

| Probability/Risk Maximum Possible Loss | Very unlikely | Unlikely | Even chance | Probable | Very likely | Certain |
|--|---------------|----------|-------------|----------|-------------|---------|
| No loss | 1 | 2 | 3 | 4 | 5 | 6 |
| First aid required/short rest/recovery | 2 | 4 | 5 | 6 | 7 | 8 |
| Fracture of a major bone or mild temporary illness | 3 | 5 | 6 | 7 | 8 | 9 |
| Loss of limb, eye, or permanent illness | 4 | 6 | 7 | 8 | 9 | 10 |
| Fatality | 5 | 7 | 8 | 9 | 10 | 11 |

Risk Assessment Score = Maximum Possible Loss x Probability/Risk

Low = 1 to 4

Medium = 5

High = 6 to 11

Frequency of Exposure Matrix

| Infrequent | Annually | Monthly | Weekly | Daily | Constantly |
|------------|----------|---------|--------|-------|------------|
| 1 | 2 | 3 | 4 | 5 | 7 |

Hazard Rating = Frequency of Exposure (FE) x Risk Assessment Score

Action Timescale

| Risk | Hazard Rating | Action Timescale |
|--------|---------------|------------------|
| Low | 1–21 | Within a month |
| Medium | 22–35 | Within a week |
| High | 35–77 | Immediately |