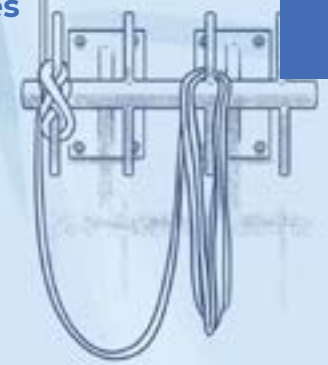
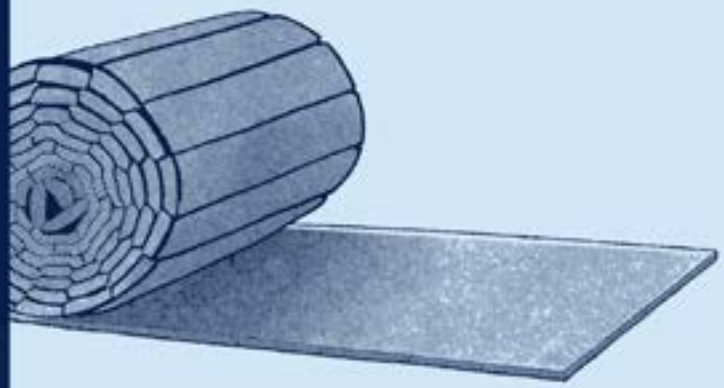
Circus Training Space and Equipment Guide

Obligations, recommendations and adherence to best practices

June 2022





Développement de
la filière de formation loisir et
préparatoire au Québec

Editor:
National Circus School (ENC Montréal)

This project was made possible with the support of the Ministry of Culture and Communications of Quebec.

Culture et Communications Québec

In this document, the masculine gender is used generically for the sole purpose of keeping the text simple.

This translation does not take into account:

- Titles of books or documentation published in French
- The increase in the cost of items after 2022
- Certain specific circus terms.

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Culture et Communications Québec

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École de cirque de Québec

L'École de cirque de Verdun

en piste
Regroupement national des arts du cirque
National Circus Arts Alliance

1.1 Foreword

In 2018, the Quebec government, through the Ministry of Culture and Communications, entrusted the National Circus School (École nationale de cirque or ENC) with the mission to develop the leisure, educational, and preparatory training sector. The key players in circus arts education in Quebec came together for this project led by ENC, forming a steering committee* that identified structuring projects, including the "Guide d'aménagement des espaces de formation et des équipements circassiens" (Guide for the Use & Design of Circus Training Spaces and Equipment). The Circus Arts Research, Innovation, and Transfer Center (Centre de recherche, d'innovation et de transferts en arts du cirque or CRITAC/HUPR*, currently renamed HUPR*, Research Centre for Human Potential) was commissioned to create this tool to meet the sector's needs.

In the winter of 2020, the implementation of this project was entrusted to Fred Gérard, a researcher and designer of equipment and performance environments at CRITAC/HUPR*. Teams of experts and specialists were assembled to produce the guide. In the winter of 2021, consultations were conducted with circus arts educators from various practices, both amateur and professional, to ensure that the guide meets the needs and expectations of future users across the Quebec territory.

Simultaneously, other work has been carried out to develop, structure, and enhance the circus arts training sector in Quebec. A national certification program for circus teachers at all levels of education, including a program for recognizing skills and competencies, has been established. Additionally, framework programs for leisure, school, and preparatory training have been implemented to provide educational or pedagogical references for all circus arts teachers throughout the territory

For more information

- Programme national de certification des enseignants en arts du cirque
- Plans-cadres de formation en arts du cirque

* Steering Committee: To ensure adherence to the work's guidelines, a consultation committee was formed with representatives from major circus schools as well as the National Circus Arts Association, En Piste.

1.2 Project team

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Translation

- Andrew Mitchell
- Fred Gérard (HUPR*)

1.3 Context

Since the 1980s, circus arts in Quebec and around the world have undergone significant changes, both in terms of artistic forms and transmission models; one phenomenon feeding the other.

In the field of training, this evolution of forms of practice has given rise to numerous venues and situations for interaction with participants.

These training programs and venues are diverse:

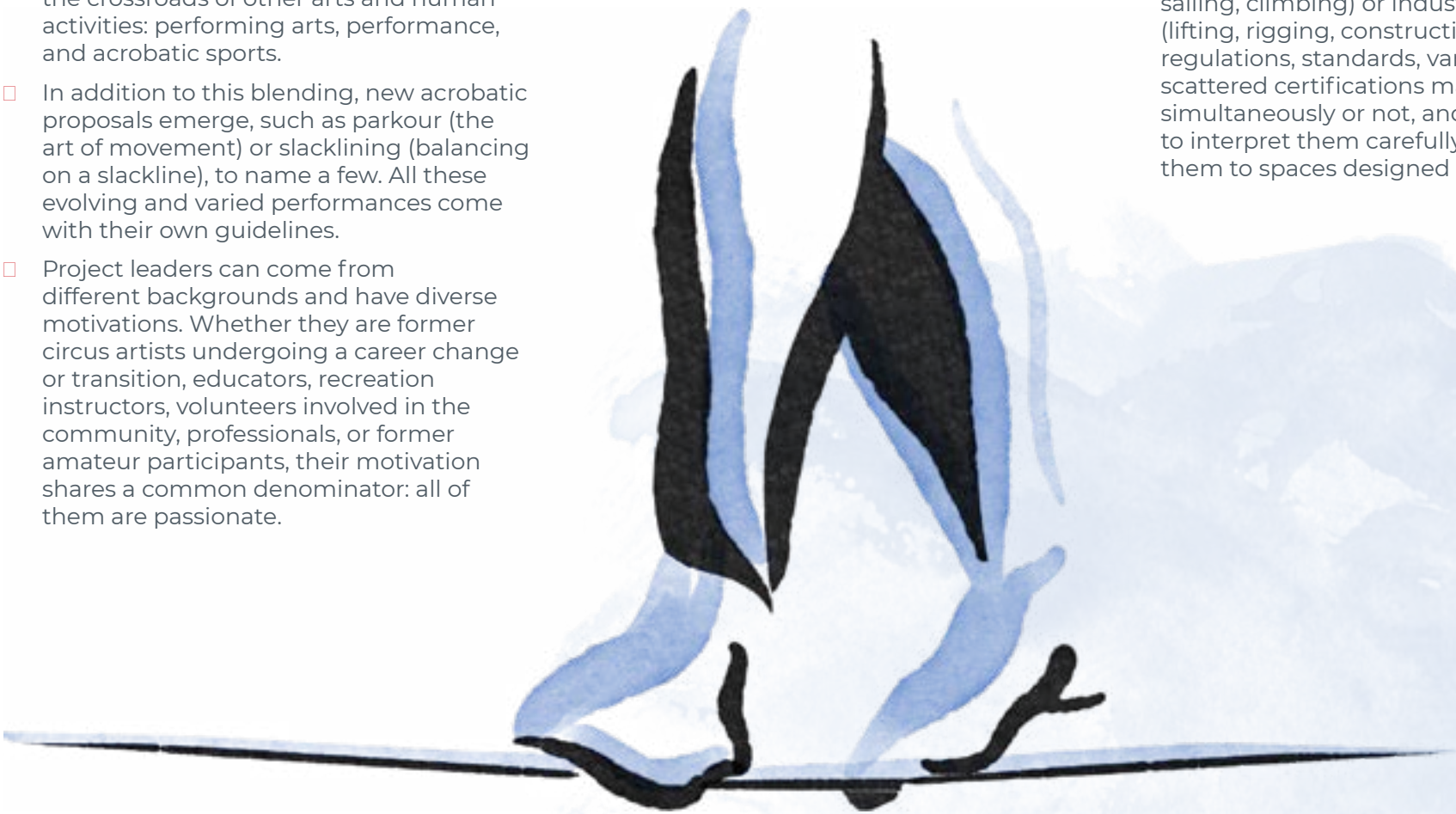
- Recreational settings;
- Preparatory programs;
- Primary and secondary schools;
- Professional schools (college-level diplomas);
- Adapted circus activities (social circus, individuals with disabilities, people with reduced mobility, specific clients);
- Private studios.

Traditionally, more in foreign countries than in Quebec, circus arts were learned within the family circle, mainly orally. Here, circus families being rarer, the sharing of culture, techniques and knowledge has taken place in a more pedagogical framework in community centers and teaching institutions. These are increasingly structured and developed throughout the country.

1.3 Context

The democratization of circus arts is characterized by the multitude of projects, the diversity of places, and the variety of practiced disciplines. Moreover, this multiplicity is indirectly linked to several legal frameworks.

- Circus is conceived as a distinct form of art with its own families of disciplines: juggling, ground acro balance, aerial acrobatics, and the art of clowning. In their modern and contemporary practice, circus arts are not a unified field but rather a form of art in perpetual hybridization at the crossroads of other arts and human activities: performing arts, performance, and acrobatic sports.
- In addition to this blending, new acrobatic proposals emerge, such as parkour (the art of movement) or slacklining (balancing on a slackline), to name a few. All these evolving and varied performances come with their own guidelines.
- Project leaders can come from different backgrounds and have diverse motivations. Whether they are former circus artists undergoing a career change or transition, educators, recreation instructors, volunteers involved in the community, professionals, or former amateur participants, their motivation shares a common denominator: all of them are passionate.
- Training projects in circus arts, led by a variety of stakeholders, develop within structures of different sizes and legal statuses. Non-profit associations, school service centers, private companies; these structures can be sponsored by municipalities or other public entities, subsidized, or commercial.
- The specificity of circus arts is that they are not standardized, much like most performing arts. It does not always align with legislative, regulatory, and structured frameworks, whether they are in the realm of associations, education, or the private sector.
- There is no specific regulation for the planning or construction of a facility or equipment for practicing circus arts, consequently, reference is made to regulations and standards from other domains such as sports (gymnastics, sailing, climbing) or industrial standards (lifting, rigging, construction). These regulations, standards, various and scattered certifications may apply simultaneously or not, and it is important to interpret them carefully before applying them to spaces designed for circus arts.



1.3 Context

Project leaders encountered several challenges regarding the lack of existing documentation:

- Reference documents (Laws, publications, tutorial, etc.);
- Tools related to the operation of training facilities and the diversity of environments (volumetrics, space management, etc.);
- Reference for suppliers of acrobatic equipment;
- Reference for specific human resources (circus technicians, acrobatic riggers and engineers with circus knowledge).

This situation leads to the observation that there is also a lack in terms of skills assessment. Due to a lack of standards and sharing of knowledge, skill levels are currently developed based on different experiences and criteria which can sometimes be contradictory or opposed.

The transmission of circus arts has become more sophisticated over the years. It now requires specially designed spaces to promote safe practice while fostering a spirit of research and development. Circus arts in various training pathways (recreational, school, preparatory, specialized, etc.) require prevention methods and risk assessment tailored to the specific activities within a professional practice framework.

In this context, project leaders find themselves facing a multitude of practical problems and gray areas, whether they are legal or not. This guide compiles essential obligations, recommendations, usage advice, and rules of the art to be followed to facilitate the implementation of projects, particularly from a technical perspective.

After consulting this guide, we hope that project leaders will seek assistance from qualified and/or competent specialists, relevant organizations or agencies, guides, and documents produced by qualified authorities to obtain detailed and pertinent information that applies to their projects. This document aims to be adaptable to different types of programs and various training environments.

1.4 Objectives of the guide

This guide is primarily intended for projects related to recreational, leisure, school, and preparatory activities in the circus arts training pathway in Quebec. This pathway precedes higher (professional) education at the college level. The guide is aimed at project initiators and leaders, administrative staff, teaching personnel, as well as technical personnel involved in the development of a training space.

This guide is a tool to assist in arranging a variety of spaces (gymnasiums, circus tents, commercial or industrial spaces, community halls, churches, basements, etc.) into safe practice spaces for circus arts. Some disciplines are only mentioned and not further developed as they are considered too specialized for the targeted training programs.

In this context, "organization" means to transform, arrange, organize, maintain, or construct.

A place for practicing circus arts is a location where circus arts are practiced or taught. A place may be entirely or partially dedicated to the practice of circus arts. In the case of mixed sporting or artistic use, care must be taken to integrate the various rules and specific standards of each practice into the project.

1.4 Objectives of the guide

This guide includes legal references to where they exist. The recommendations, basic advice, and rules of the art cited in this guide are those used by the majority of the circus community, both in educational and professional contexts.

Legal references can come from different levels of legal authority: general codes such as the Building Code, Civil Code, Penal Code, and Labor Code, as well as services related to fire safety and urban planning. Additionally, manufacturers' instructions, rules of the art, collective agreements, and internal regulations of companies are also important sources of legal guidance.

This guide encourages the reader to ask pertinent questions regarding the project's realization and to engage in dialogue with stakeholders, designers, owners, managers, and project leaders.

Safety culture is crucial to prioritize from the beginning of the project to best facilitate the layout of the space and equipment. This enables future circus teachers and technicians to feel accountable and be part of a team actively committed to risk management.

This guide is a continuation of the few official publications addressing the layout of a space dedicated to circus arts, such as.:

- ***"La sécurité dans les arts du cirque"***, written by Éric Bourassa and Jocelyn Riopel, teachers, with the collaboration of Alain Rousseau, health and physical education pedagogical advisor. Produced by the Preschool and Elementary School Learning Resources Department.
- ***"Mémento conception et fabrication des agrès de cirque"***, published in October 2003 by the Association Hors-Les-Murs with the support of the French Ministry of Culture.
- ***"Aménagement d'un lieu de pratique des arts du cirque"***, DGCA
- Publications from the European Federation of Professional Circus Schools (FEDEC), the French Federation of Circus Schools (FFEC)and the European Association for Circus Research, Innovation and Safety (AERISC).

These publications aim to enrich a common language in the technical field of circus arts. While these publications may raise similar questions, this guide, on the other hand, offers practical and visual answers specific to Quebec.

1.5 Human resources and external contributors

The proliferation of circus companies and training facilities since the 1980s has led to the emergence of new roles: circus arts teachers and circus technicians. These two roles, pivotal in pedagogical and technical supervision, are currently still unregulated.

1.5 Human resources and external contributors

Teachers in circus arts

Instructors or trainers (sometimes called initiators, teachers, supervisors or coaches).

In the context of the Development of the Circus Arts Training Sector in Quebec, the National Certification Program for Circus Arts Teachers addresses the need to regulate a currently unrecognized profession in Quebec and Canada.

Even though there have been professional teachers for a long time, there is still no recognition of this profession.

Teacher certification and its system of recognition of prior learning and competencies responds to the needs of active teachers and the needs expressed by teachers in the study carried out by the Centre for Research, Innovation and Transfer in Circus Arts. (CRITAC/HUPR*) Rapport de l'état de la pratique du cirque, loisir, scolaire et préparatoire.

A level-based structure, grounded in the teaching contexts of circus arts (school and recreational versus preparatory and higher education), provides a framework for the profession. Targeted and certified training will be added to recognize specific skills: teachers of specific disciplines or those specialized in working with specific audiences with particular needs, for example, in social circus, adapted circus, or early childhood contexts.

Currently, the only training programs recognized by the Ministry of Education and Higher Education of Quebec are offered by the National Circus School (École nationale de cirque or ENC), and this has been the case since 2002: the Collegial Studies Certificates (AEC) for initiators, instructors, and trainers in circus arts.

Excluding training for circus technicians and riggers, these AEC training programs in circus arts, along with teacher certification, provide the fundamentals of installing and operating acrobatic equipment, as well as an approach to safety competence such as risk analysis in general. These training programs ensure a necessary level of competence in the context of circus teaching.

In the development of teacher certification, the task of the teacher is defined. It consists of a set of sub-tasks with a level of complexity graded according to the level and teaching context, which includes safety.

There are few training programs for circus arts teachers worldwide. In addition to the training provided by the National Circus School (ENC), France stands out with programs recognized by the government through the Ministries of Education and Culture, offering federal and state diplomas overseen by the FFEC. This includes accreditation policies for training venues.

1.5 Human resources and external contributors

Main tasks of circus arts teaching:

- Planning a training session;
- Implement the elements of an appropriate training program;
- Supporting the student in the practice of circus techniques;
- Analyze performance;
- Supporting artistic creativity;
- Apply or develop a program for the student's psychological and motor development;
- Providing a safe environment;
- Take ethical decisions.

1.5 Human resources and external contributors

Les techniciens de cirque

Technical supervisors, acrobatic riggers, head riggers, circus school riggers, scenic riggers with circus experience, etc.

Rigger refers to technicians working in a variety of fields, with a multitude of specializations (theater, arena, construction, rescue, sailing, rope access, climbing, etc.). This creates a confusion of practices, references, expertise and standards.

While, in traditional circus, the technical rigging responsibilities typically fell on former acrobats, this circus technician profession has undergone a significant transformation since the 1980s. The profession of stage or show rigger already existed, this name and this professional reference were preserved and used, but the specificity of the circus technician is, to this day, still not legally recognized.

There are certification or diploma courses in stage rigging in Quebec (Collège Lionel Groulx, Productions Jeun'Est, etc.). However, there is no qualifying or diploma training for circus technicians.

The national circus arts association En Piste, for example, has been offering a circus arts-specific training course since 2006: "accrochage d'agrès acrobatiques", however, this training offers no recognized qualification.

In France, the profession of circus technician has been recognized since 2022 and is listed in the national directory of professional certifications (RNCP). A diploma course has been available since 2019 at the Centre National des Arts du Cirque (CNAC) / Chalons en Champagne.

The skills of circus technicians, just like acrobatic rigging methods, require specific knowledge and involve significant risks. This requires that these professionals be trained and experienced.

This guide only scratches the surface of the issue of the lack of recognition for the circus technician profession. However, it is important to note that this work is not a manual for circus technician training. It is strongly recommended to undergo specialized training in this field or to seek assistance from individuals who have received training in circus rigging (officially recognized or not) or those who have recognition within the industry.

The main challenge in this currently unregulated profession lies in the comparison between the competent circus technician of today and the qualified circus technician of tomorrow...

For more information

Appendix 2 : Ressources humaines

1.5 Human resources and external contributors

The various participants

To bring a project to fruition, many different participants are called upon to collaborate:

- **Property owner:** Municipality, non-profit organization, or private owner. The owner's authorization is required for any modification to the building.
- **Building / site operations:** Individual or legal entity responsible for the premises and, consequently, fire safety, etc.
- **Activity organizer or project leader:** Individual or legal entity responsible for the project. The organizer defines the needs in terms of activities and the layout of the property according to the project they are developing.
- **Project manager:** Individual or company responsible for coordinating the implementation of the project's developments. They contact companies and suppliers, coordinate the schedule of work, installations, and deliveries. They are responsible for ensuring the project is carried out in accordance with the plan.
- **Instructors or trainers:** Initiator, trainer, educational supervisor, or designated individual responsible for delivering the program or courses within the project and who interacts with students and participants. All instructors must be informed of the rules for using the premises and comply with them. They are also responsible for ensuring that these rules are enforced among the participants.
- **Circus Technician / Acrobatic rigger:** Individual designated by the organizer to set up and equip the venue. They are in contact with instructors and participants. All circus technicians must be informed of the rules for using the premises and comply with them. If circus technicians are required to work at heights, relevant training is mandatory.
- **Participants:** Students, novices, professional practitioners, general public, etc. must adhere to the rules outlined by the instructors and other project authorities.

Note: These roles are not necessarily distinct individuals.

Each of these individuals should be aware of the responsibilities that are required of, which should be clarified in writing from the early stages of project implementation.

This can take the form of contractual documents such as agreements, contracts, letters of understanding, provision of personnel or services, loans, leases, etc.

These documents must be updated to take account of all project developments (change of operator, development of a new activity, change of proprietor, subletting, expansion, etc.) to distinguish the direct and indirect responsibilities of each of the parties involved.

1.6 Budget and equipment acquisition

The project leader must be aware of the budget realities in the acquisition of specific circus equipment.

For more information: see Chapter 3 - Planning criteria by discipline.

When choosing a floor surface or specific training mats, the choice should be guided by its use and the circus disciplines being taught. The choice should be made in conjunction with the instructor, pedagogue or an expert in the discipline.

In all aspects of purchasing, it's important to analyze several factors before deciding.

General criteria to be considered:

- The disciplines;
- Profile of participants;
- intensity of use;
- Installation time;
- Storage space;
- Maintenance costs and service life.

While the manufacturing standards of certain sports federations can be used as references for certain disciplines (mats, equipment, apparatus, etc.), there is nothing specific for circus equipment.

Considering this observation, it is therefore necessary to pay special attention to the choice of equipment and acrobatic apparatus.

It is important not to confuse acrobatic apparatus from different sports federations with those referred to as "recreational" or "entertainment" apparatus intended for the general public.

It is strongly discouraged to use equipment sold in large retail stores and on the internet that is manufactured under so-called "recreational" standards. (Réf: American Society for Testing and Materials (ASTM)) as their usage does not meet acrobatic requirements.

Specific criteria for acrobatic equipment:

- Resistance to the effects of acrobatic dynamic factors;
- Durability;
- Ergonomics;
- Quality of materials;
- Traceability.

After reading the guide, the implications for human resources, inspection and maintenance should be noted. The project manager must refer to the appropriate personnel in order to make the right choices.

Price variations are shown in the tables in the discipline sections. Prices are indicative and come from a selection of the most frequently quoted equipment suppliers.

- Atelier Foret Inc : Manufacture and design of acrobatic and aerial accessories (straps, harnesses, belts, etc.)
- Black Z : Manufacture, design and distribution of acrobatic and aerial apparatus, online store specializing in verticality applied to the world of show business.
- Circus Concepts : Manufacture, design and distribution of acrobatic and aerial apparatus, online store for circus and juggling equipment.
- Création Fil Lion : Manufacture, design and distribution Design and production of acrobatic equipment.
- Goudurix : Online store for circus, bicycle and juggling equipment.
- Les Ateliers Richard Bilodeau : Cyr wheel manufacturing.
- Sollertia : Reference for big tops, tents, structures and inflatables.
- Unicycle : Circus and juggling equipment online store.

1.6 Budget and equipment acquisition

Budget

The cost varies depending on the chosen discipline. Suitable work surfaces, reception mats, and training mats represent a certain cost, but it is not higher than that required to equip a sports facility, considering that similar sports equipment is often used.

In addition to the initial purchase cost of the equipment, one should not overlook the expenses related to its installation and maintenance. It is important to note that additional costs may arise in terms of engaging a circus technician's expertise and, in certain cases, hiring an engineer.

To fully understand and grasp the importance of equipment acquisition in a budget, it is important to discuss with those responsible for budgeting or financing the ability to finance and absorb the expense of this equipment in the overall long-term project budget.

1.7 Caution

Specificity, laws, standards and good practice to be respected

We would like to insist on the fact that the recommendations contained in this guide are based on compliance with good practice. In the absence of standards or regulatory texts specific to the circus arts, this guide provides existing legal references to answer questions from circus pedagogue and technicians, as well as school directors, managers, etc.

This guide does not contain an exhaustive list of the general and legal dispositions applicable to artists and technicians in all the performing arts. For these questions, it is advisable to refer to official texts and specialist publications, such as the Labor Code and the recommendations of the "Commission des normes, de l'équité, de la santé et de la sécurité au travail" (CNESST).

Legal value of recommendations, advice and best practice

As such, the recommendation is not a regulatory instrument, and the aim of this guide is not to impose additional constraints, but rather to help pedagogues and all other employees to fulfil their obligations in the best possible way.

Data and result

The figures and data used in this guide on the forces generated on the apparatus during movements performed by acrobats are taken from a study carried out by Marion Cossin, research engineer at CRITAC/HUPR*. The study's objective was to scientifically measure the maximum forces applied on the apparatus. This study was carried out with several acrobats, for different movements, with the objective of issuing recommendations on safety when rigging or designing acrobatic equipment.

Evolution

Considering the evolution of technical equipment as well as physical performance and quantitative data, it is the responsibility of circus technicians and pedagogue to be aware of the latest technical and scientific developments.

1.7 Caution

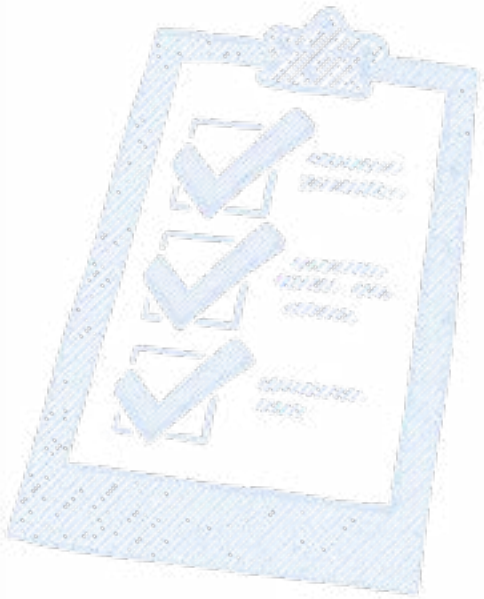
Explanation of the texts and technical terms

If you don't understand some of the technical or acrobatic terms in this guide, there are a few reflexes you should develop:

- Refer to the terminology presented in Annex 5 for explanations of technical terms.;
- Find out more when you don't understand how to explain technical terms;
- Find out about the technical training courses to be taken or to be followed by staff;
- Call on competent circus technicians to support your project.

Pandemic and special hygiene measures

This guide was developed during the COVID-19 pandemic. Those responsible for the health measures in places where circus arts facilities were already in operation adapted the necessary measures based on government guidelines. Given the evolution and variability of restrictions, we have limited the guidelines in this guide to those that may still be relevant. We recommend staying vigilant to all government directives to ensure the health and safety of everyone



2 - Premises and buildings

2.1 Introduction

Considering that circus arts practice premises are public spaces, the Building Act requires compliance with the Construction Code and the Safety Code for buildings and equipment intended for public use. There are also rules regarding electrical installations, plumbing and fire safety services.

In Québec we must therefore refer, among other things, to:

- La Régie du bâtiment du Québec (RBQ);
- Le Code national du bâtiment (CNB) adopté par la RBQ (CNB–2015, présentement en vigueur);
- The fire prevention and safety services of the municipality involved;

Outside Québec, contact relevant government institutions regarding applicable safety and building codes.

The definition of the project (ex: size, number of participants, etc.) indirectly imposes constraints on the choice of the location and its development.

Once the project is well defined and the location identified, a thorough process should be put in place to ensure that the project is a success:

- The number of participants to be accommodated and the disciplines that can be practiced must be considered;
- The process determines the schedule to be met, the technical resources to be put in place and the human resources required;
- It also ensures the establishment of rules for the use of the venue and equipment once the practice is underway.

During the operation of the venue, time must be set aside for the installation, assembly, and de-installation of equipment. Time must also be set aside for servicing, maintenance and regular inspections. The separation of these technical times from practice times is necessary to ensure that these tasks are carried out safely.

Any site development project aims to achieve a well-defined and time-bound goal. This requires following a precise approach with competent human resources and technical means available.

For more information

- RBQ: Régie du bâtiment du Québec
- CNB: Code national du bâtiment
- Rôles et responsabilités en sécurité incendie

2.2 Volumetrics

It is important to ensure that the height and surface area of the premises are consistent with the disciplines envisaged.

Each circus discipline requires a minimum space, specific equipment, trained personnel, and ongoing maintenance supervision of the specific equipment.

It is important to note the relationship between the height of the premises and the possible acrobatic disciplines.

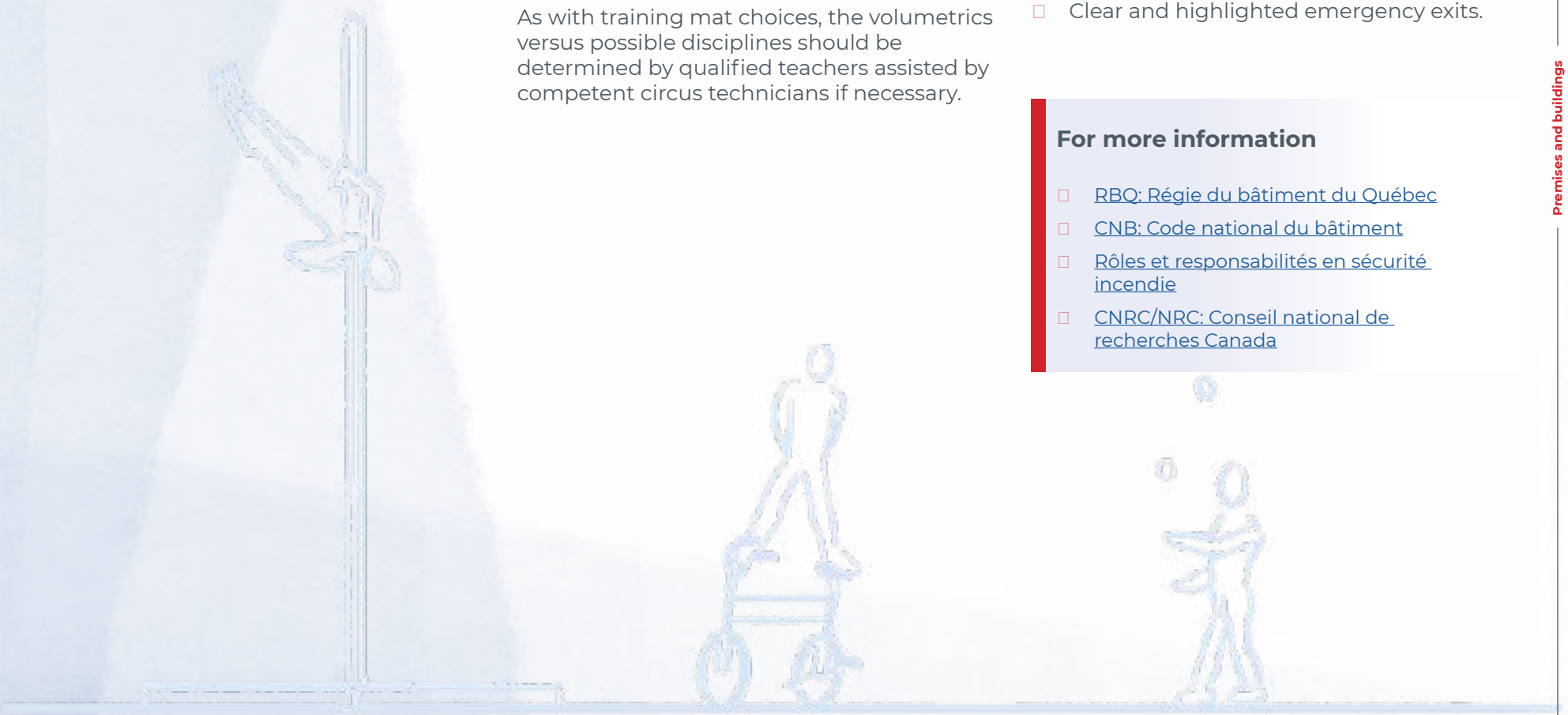
As with training mat choices, the volumetrics versus possible disciplines should be determined by qualified teachers assisted by competent circus technicians if necessary.

In the implementation of the project, it is legally necessary to:

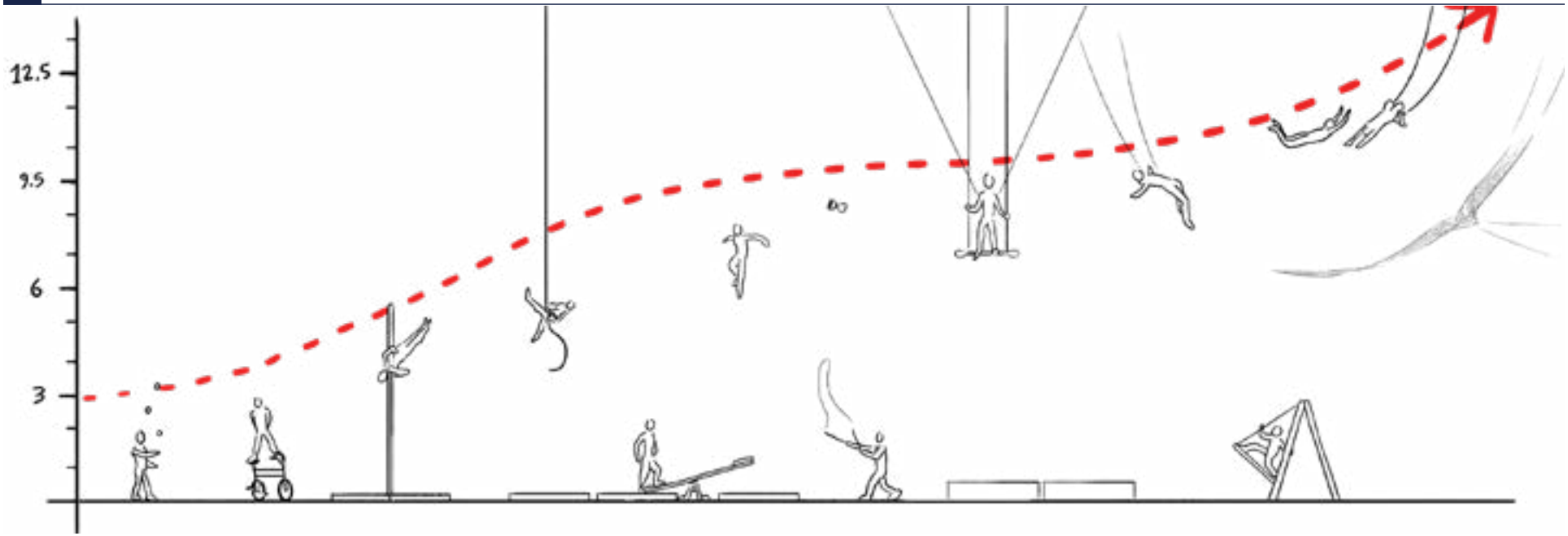
- Refer to "La Régie du bâtiment du Québec" (RBQ) the National Building Code (NBC), and the security or fire prevention services of the municipality involved;
- Define and display building rules;
- Provide the facility with an emergency response plan and signage in the event of an evacuation;
- Clear and highlighted emergency exits.

For more information

- RBQ: Régie du bâtiment du Québec
- CNB: Code national du bâtiment
- Rôles et responsabilités en sécurité incendie
- CNRC/NRC: Conseil national de recherches Canada



2.3 Relationship between height, level of performance and discipline



This table is not exhaustive and serves as a general example. If it is possible to initiate certain disciplines within less than 3 meters, the pedagogue must ensure to adjust the teaching to the height and available surface area.

3 to 4 meters	6 meters	9,5 meters	12,5 meters to 17 meters
☐ Juggling (initiation), antipodism ☐ Floor acrobatics, contortion, hand to hand, banquine (initiation) ☐ Balance ball, handstand, stilts, rola-bola, tight wire, slack wire, slackline, unicycle, Cyr wheel, German wheel, bicycle, etc. ☐ Dance, acting	☐ Chinese pole ☐ Trampoline (initiation, amateur) ☐ Aerial: Fixed trapeze, dance trapeze, rope, aerial hoop, silks, straps, etc. ☐ Acro balance, banquine (intermediate)	☐ Juggling, diabolo (initiation) ☐ Trampoline and trampoline wall ☐ Swing trapeze (4-meter rope length) ☐ Cloud swing (4-meter rope length) ☐ Teeterboard or Korean teeterboard (initiation) ☐ Russian barre (initiation) ☐ Mini flying trapeze (with safety mats) ☐ Cradle, Russian cradle	☐ Full-height juggling ☐ Flying trapeze and other complex aerial concepts ☐ Russian Swing (advanced Level) ☐ Teeterboard or Korean plank (advanced Level) ☐ Russian barre (advanced Level)

2.4 Walls, partitions and subdivisions

A place dedicated to the practice and teaching of circus arts can accommodate a variety of uses (sports, dance, theatre, etc.). It is very important to organize the space by delimiting areas dedicated to certain disciplines according to their specific requirements. These areas do not need to be partitioned; they can be demarcated by floor markings.

In general, and more specifically:

- The walls have a smooth finish, without roughness and without any visible structure. There are no cabinets, shelves, objects affixed to the walls, boards, nails, cleats, hooks, etc. up to the height suitable for the exercise performed
- The walls are made of strong materials that are resistant to impact. They must be adapted according to the disciplines or performances practiced (e.g. trampoline-wall, parkour, etc.).
- The walls are covered with mats or padding, if necessary.
- The windows and mirrors are protected by nets, cables, or ropes stretched to prevent impacts from equipment such as the balance ball, Cyr wheel, German wheel, bicycle, unicycle, juggling props, etc.
- For walls equipped with windows, mirrors, various light sources, large doors, etc., they are arranged in a way to limit glare.
- Safety margins are set up between the practice areas and the walls (landing zone, deceleration area, accidental exit from the practice area, etc.)
- Engineered pin rails can be installed into existing permanent walls. It is recommended that pin rails are situated at a minimum of 2 meters to maximize the working volume of the space.
- For double-leaf doors, a porthole or peephole window is installed to see if someone is behind it and/or to identify the direction of traffic flow.
- For walls equipped with dance bars or traction bars, the installation is done considering the forces that will be exerted as educational support during learning for other disciplines such as stilts, balance balls, unicycles, etc.

2.5 Flooring

This section deals with floors. For more information on fitted floors, carpets and mattresses, see Chapter 3.7.

Each circus discipline has its own specific floor requirements. These are designed to optimize the acrobat's performance and reduce risks (incidents, slips and repetitive impacts).

A wide variety of floor coverings are available. This guide divides them into several categories. Each has its own advantages and disadvantages. The choice will be guided by the use and the circus disciplines practiced. Elasticity, bounce, suppleness, grip, load-bearing capacity, color, ease of laying, etc. are all considered. color, ease of installation and maintenance and, finally, service life and cost.

For a new project or the adaptation of an existing venue, the choice of flooring should be defined by qualified teachers, assisted, if necessary, by a competent circus technician.

Care must be taken with the loads imposed on the floors related to certain disciplines such as Chinese pole, Korean teeterboard, Teeterboard, tightwire, etc. Distribution or spreader plates at the base of these apparatuses can be used to prevent permanent deformation of these delicate floors under load. Additionally, some disciplines require appropriate floor resistance.

2.5 Flooring

Examples of loads

In the case of stage flooring, the resistance of 500 kg/m2 should be supplemented by resistance to punctures (sinking of a surface, settlement of a floor, deformation of a structural element under the effect of a localized load, etc.).

For more information

- Étude de Marion Cossin : Tests de 3 planches coréennes

By way of example, here are a few examples of quantitative loads:

- Tightwire A-frame: load capacity up to 1,000 kg per "A frame" (for wire tensioned to 1,500 kg);
- Chinese pole base load up to 600 kg (with 4 guy wires at 200 kg in addition to the weight of the mast and performer));
- Teeterboard or Korean bases: the load reaches 400 kg to 500 kg in amateur use and can reach + 1200 kg in professional use;
- Russian cradle: on 2 supports, the load can reach about 300 kg per support;
- Trampoline 4 supports, the load reaches 600 kg per support.

Disciplines	Coverings
German wheel, Cyr wheel, ladder, Rola-bola, stilts, balance ball, bicycle, unicycle, etc.	Wood, dance and sport flooring (less than 5 mm thick)
Acrobatic floor.	Flexi roll (approximately 25 mm thick)
Handstand, hand to hand, Chinese pole, trapeze dance, straps, hoop diving, etc.	Wood, dance and sport flooring (4 to 9 mm thick)
Dance, acting, etc.	Wood, dance and sport flooring (4 to 9 mm thick)
Juggling, antipodism, icarian, etc.	Wood, dance and sport flooring (4 to 9 mm thick)

Non-exhaustive list, these coverings can also apply to aerial disciplines during groundwork with the addition of mats for high-level figures.

2.5 Flooring

Legal aspect

There are sports standards for gymnastics, martial arts, etc., however there are no standards for practicing circus arts. As with dance, one must rely on best practices and the knowledge and expertise of the pedagogue.

Just like any other acrobatic equipment, precautions apply to the floor and covering, such as appropriate use, maintenance, storage, etc.

Information and Advice

- Unsuitable floor surfaces can increase the risk of injury.
- Floor surfaces and mats may require additional training mats depending on the discipline and the type of figure envisaged.
- Clear floor space, free of personal effects such as backpacks, bottles, clothes, etc.
- The surface is stable and regular depending on the discipline practiced.
- The color is matte to avoid glare.
- Preferably, the color should be light or different for areas where balance disciplines are performed on an object (wire, balance table, etc.). Otherwise, we recommend placing a different-colored carpet or mats under the equipment.
- Surfaces are washed regularly for hygienic reasons and to prevent slippery or sticky surfaces. Special attention should be paid to prevent standing water floor accumulating underneath floor surfaces.)
- The floor covering does not slip when used during practice.
- Some wood floors can be very expensive to maintain.
- Some apparatus or accessories, such as rebound stilts, tightwire A-frame, unprotected stilts, etc., are very aggressive to floors, especially hardwood floors, or sports floors.
- For outdoor use, the ground must be clear, even and stable (sand, grass, etc.).
- Work areas are arranged according to the disciplines taught. Safety zones are set up between practice areas and reception areas, in case of uncontrolled deceleration or exit.
- Beverages are only allowed in a leak-proof plastic container.

Not recommended:

- Bare concrete or asphalt;
- Very slippery surface (smooth concrete and some sports floors));
- Uneven floors;
- Old wooden floor;
- Damps surfaces;
- Food in the training or practice area;
- Glass container.

2.6 Ceilings and Structures

Ceiling structures are essential for practicing aerial circus disciplines.

The installation of a technical grid (a metal structure installed beneath the ceiling) allows for height modulation and facilitates the rigging of equipment. This enables better management of aerial space. The purchasing cost of these structures is significant.

Legal side

- The load capacity (point load, distributed load, and total load) of the ceiling and technical grid must be calculated and approved by an engineer.
- The aerial structures installed (technical grid, lifeline, access walkway, etc.) must be approved by an engineer.
- The information on the authorized loads at attachment points, as defined by the engineer, is documented, archived, and easily accessible.
- Steel safety links (cables, steel-flex slings, etc.) are used to prevent suspended structures (lighting trusses, spreader bars, aerial apparatus, etc.) from falling in the event of a fire.
- Access to the technical grid and walkways is restricted to authorized and trained personnel. These environments are regulated by CNESST regulations.
- Training is compulsory for all personnel required to work at heights. The technical director ensures that personnel have the required up to date qualifications.

For more information

- CNESST: Commission des normes, de l'équité, de la santé et de la sécurité du travail

2.6 Ceilings and Structures

Information & Advice

- A methodology for working at heights is established and adhered to.
- All structural elements of rigging, permanent or temporary points for the attachment of acrobatic equipment are designed, installed, inspected, and documented by competent personnel.
- The acrobatic rigging points are located at a safe distance from other ceiling elements such as lights, ventilation ducts, electrical wiring, plumbing, and fire systems to prevent burns, cuts, abrasions, and other mechanical malfunctions that could damage acrobatic rigging equipment.
- Checking the integrity of the attachment of ceiling elements (acoustic panels, lighting, etc.) is part of the maintenance program.
- The acrobatic elements suspended from the ceiling must be independent from other suspended elements (lights, plumbing, etc.).
- The ceiling and walkways are free of any unsecured objects.
- The rigging points are easily and safely accessible with access to be visually and physically inspected by trained and authorized personnel.
- Safety-related signage should be visible to inform the non-authorized personnel not to touch accessible rigging points.
- Regular ceiling cleaning is performed to remove dust buildup that could disturb users.
- Each acrobatic rigging point should be able to accommodate at least 2 to 3 people based on their weight and acrobatic level. For more information, refer to Section 3.5.6 - "Example of Load Cases for Single-Point Installation" in the chapter».
- It is recommended to put load signage on the acrobatic rigging points.

2.7 Light Sources and Lighting

For safety and comfort reasons, it is important that the participants' vision is not impeded.

The lighting will be sufficient and adapted to the activity practiced.

Legal side

It is mandatory to have an emergency lighting system. It must provide sufficient lighting to safely evacuate individuals in the event of a power outage. Additionally, regular checks of the emergency lighting systems are mandatory.

If the venue hosts other activities, it is mandatory to adhere to the lighting standards defined by the organizers of the other involved activities.

Information & Advice

- Natural lighting from the top of the building, or more specifically, zenithal lighting, is preferred.
- The natural and/or artificial lighting should not be distracting for participants. It is well distributed, even and should avoid casting shadows.
- The natural and/or artificial lighting meets the criteria of various circus disciplines (juggling, aerial acrobatics, and ground acrobatics) and provides spatial references for performances.
- Natural lighting is preferred for health, ecological and economic reasons. If the natural light is insufficient, artificial lighting should be added until the ideal luminosity is achieved.
- Care must be taken to limit or eliminate glare. The use of curtains or blinds should be considered to reduce glare. The curtains or blinds must be made of non-flammable or fire-resistant materials.
- Artificial lighting is most effective if it has multiple levels of intensity and multiple lighting zones.
- Visual comfort can be promoted by choosing light and matte color filters.
- Ambient or stage lights are installed independently of acrobatic installations due to vibration and dynamic acrobatic shocks.
- The ability to control daylight is also an advantage not to be overlooked for work with stage lighting (performances or shows).
- Reflections in mirrors can also be a cause of glare.
- Windows and mirrors are protected by nets, cables, rails or ropes to prevent impacts from equipment such as a balance ball, Cyr wheel, German wheel, bicycle, unicycle, juggling props, etc.
- Special attention should be taken with regard to synthetic materials used in rigging when in direct sunlight.

For more information

- CCQ: Commission de la construction du Québec
- CNB: Code national du bâtiment
- RBQ: Alimentation électrique de secours - RQQ
- CNPI: Code national de prévention des incendies

2.8 Thermal atmosphere

Temperature, air quality, and humidity suitable for practicing circus arts are maintained to enhance the comfort and safety of users.

Legal texts do not set minimum or maximum thresholds regarding the temperature to be maintained in a practice venue. It is therefore up to the supervisors and the pedagogical to assess whether the temperature allows for the conduct of activities.

According to the CNESST, the thermal comfort inside an establishment (the temperature) is between 12 and 20 degrees Celsius depending on the physical activities.

For your information, recognized circus arts and sports training venues stabilize the temperature of their training rooms around 20 degrees Celsius (generally 18 to 22 degrees C). (Réf: Cirque du Soleil, l'École nationale de cirque (ENC), le Centre national des Arts du Cirque (CNAC), Fédération Française de Gymnastique (FFG).

It is mportant to mention that the humidity level is essential in the perception of the thermal environment. Health Canada estimates that it should not fall below 30% in the winter and not exceed 55% in the summer.

Ideally, the rate is kept between these two percentages.

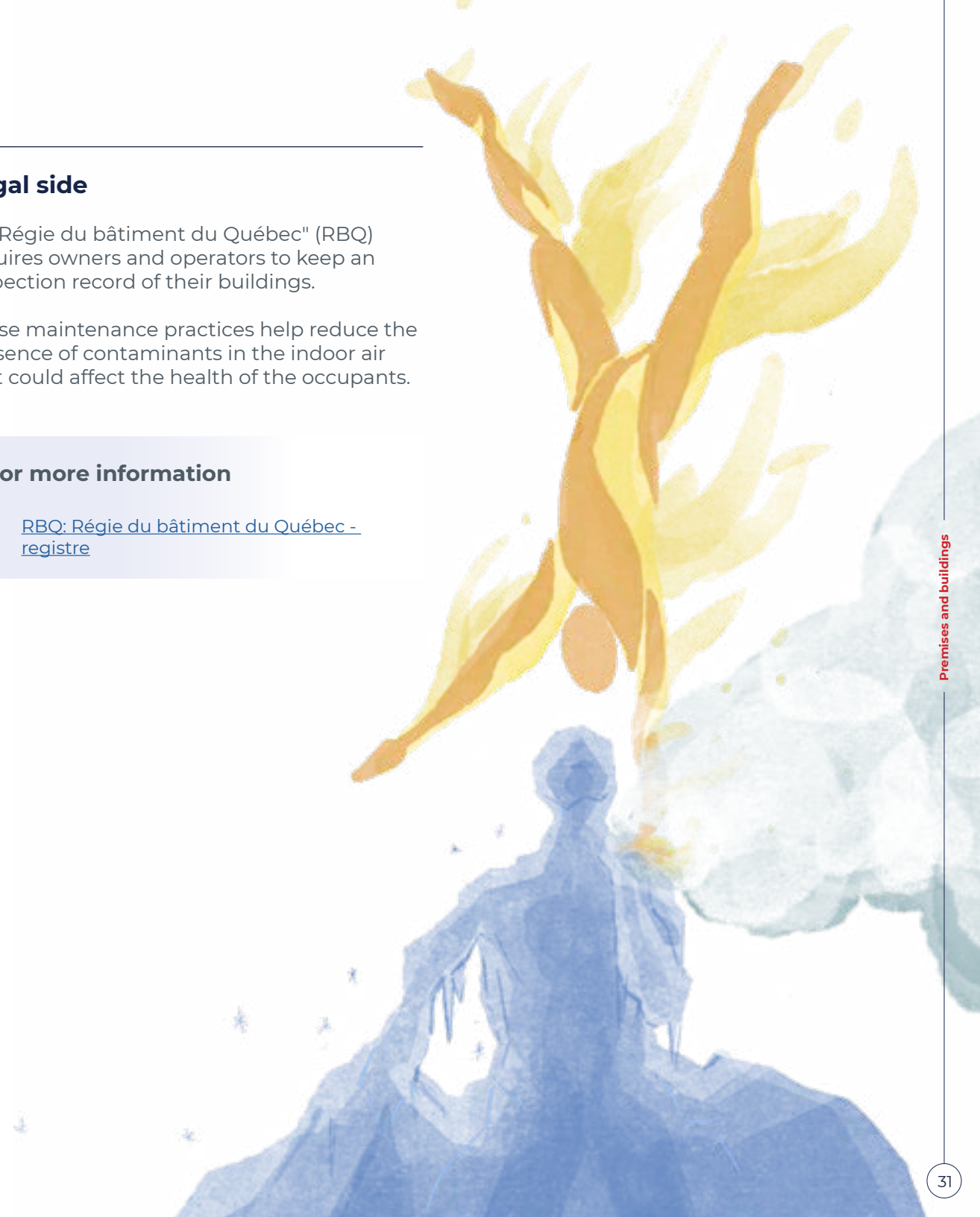
Legal side

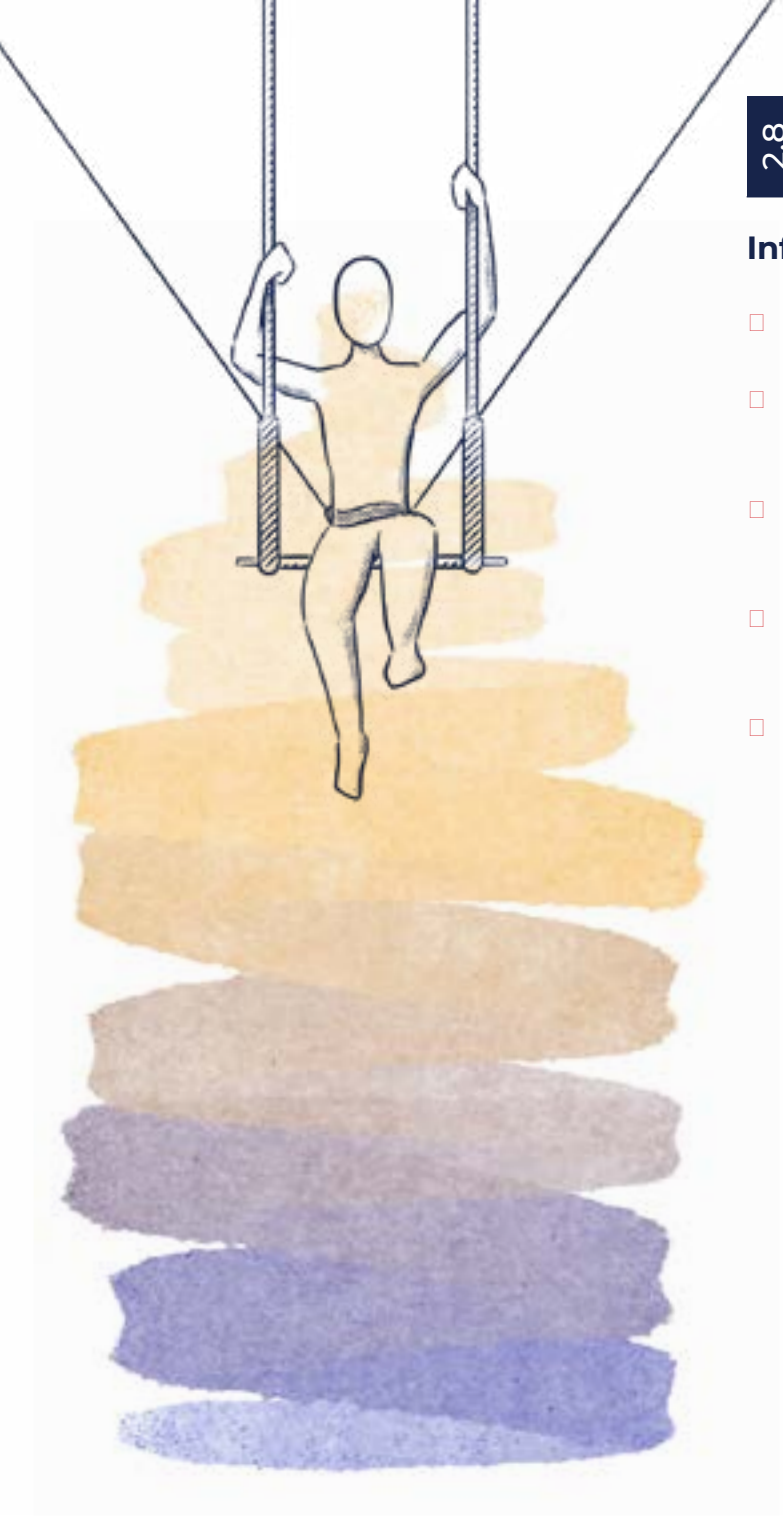
"La Régie du bâtiment du Québec" (RBQ) requires owners and operators to keep an inspection record of their buildings.

These maintenance practices help reduce the presence of contaminants in the indoor air that could affect the health of the occupants.

For more information

- RBQ: Régie du bâtiment du Québec - registre





2.8 Thermal atmosphere

Information & advice

- Ventilation is designed for air circulation adapted to the volume of the room.
- Air conditioning or a heat pump is the ideal solution for controlling the thermal ambience of an area.
- Ventilation ensures uniform air distribution and improved temperature distribution.
- Ventilation is as silent as possible so as not to affect communication between participants and/or teachers.
- Ventilation is well directed so as not to interfere with the practice of circus arts (strength and efficiency).
- When designing a ventilation system care must be taken (with regards to ducting) not to obstruct the safe access and movement of technicians in the ceiling).
- Some heating systems can dry out the air. It is important to check and maintain a healthy humidity level indoors.
- Pay attention to temperature variation in high-ceiling rooms, especially in spaces where aerial acrobatics are performed. The higher you go, the warmer it gets. This phenomenon is particularly true under a tent, hence the importance of having good ventilation.
- The temperature should be easily adjustable, preferably under the responsibility of a single designated manager, to prevent malfunctions in heating systems, which are generally complex and sensitive to repetitive variations.
- There are various heating systems available. It is important to carefully analyze the advantages and disadvantages related to wall, floor, and ceiling arrangements.

2.9 Sound system and acoustics

Noise is an indirect risk factor and has a negative effect on physical and mental health. It has consequences on learning abilities and on the safety of users in space.

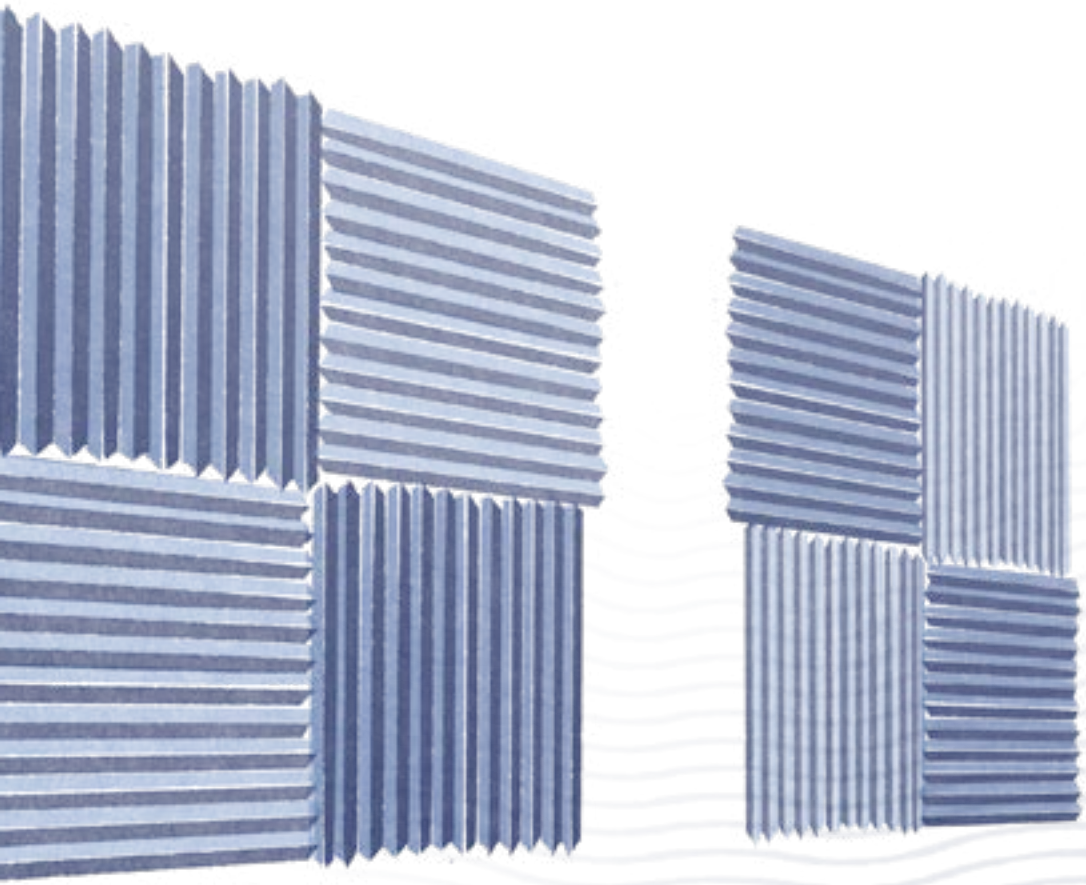
For more information

- Code national du bâtiment

2.9 Sound system and acoustics

Informations et conseils

- Information & advice
- To ensure the smooth running of activities and understanding between participants, the venue should have the best possible acoustics. Particular care must be taken when activities take place in large spaces (gymnasium, church, etc.) where echoes and reverberations are significant.
- To reduce noise levels and the reverberation effect in large volume space, an audio-technician could be consulted. Acoustic insulation could be incorporated into the site through the use of certain materials, by adding absorbent panels to walls, ceilings or floors, or by adding curtains.
- Organizational management must be ensured to avoid the simultaneous practice of disciplines likely to generate noise and incompatible nuisances. For example, avoid practicing teeterboard next to a hand balancing class, or performing a bouncing ball juggling class at the same time as a class requiring concentration, such as balancing, contortion, etc.
- Particular attention must be paid to the acoustic treatment of the space, considering possible external sources of noise pollution. Care must be taken to ensure that the activity does not disturb the neighborhood. This phenomenon is rapidly amplified under a big top.
- Proper sound calibration must be planned when installing an amplification system. Beware of ground cables when installing in passageways, practice areas or emergency exits.



2.10 Big Tops and outdoor structures

The big top is an important setting for circus arts. It provides a typically circus universe

Due to its specific nature, the big top is not only a unique place to perform, but also to install. It's a living building in constant motion. This reality demands that acoustic, thermal and structural constraints be considered.

The big top is a specific temporary structure that complies with strict standards.

Legal side

- When planning the installation of a big top or outdoor structure, it is necessary to consult the appropriate documentation and professionals.
- A contractor's license issued by the "Régie du bâtiment du Québec" is required for any surface area over 1,000 square feet (canvas area).
- For the installation and use of big tops and tents, it is important to refer to the regulations in force and to consider the recommendations for the safe use of these temporary structures. (Events, fairs, carnivals, festivals, etc.).
- The Quebec Construction Code stipulates that "the structure of a tent or inflatable structure must be designed and installed to withstand the loads applicable to it". In particular, it specifies that a tent or an inflatable structure used during the winter season must be designed to withstand snow, ice and freezing rain including the implied wind loads.
- Municipalities may also have requirements. For example, for Quebec City, the structural elements of the tent (poles, ropes, anchors, etc.) and its fittings (bleachers, stands, stages, etc.) are certified by an engineer who is a member of the "Ordre des Ingénieurs du Québec".

For more information

- Tentes et chapiteaux: prudence en saison hivernale - Régie du bâtiment du Québec
- Tente et chapiteau Québec
- Les événements en plein air : Régie du bâtiment du Québec

2.10 Big Tops and outdoor structures

The qualified engineer must:

- Be able to certify that the equipment and its installation comply with applicable standards;
- Provide a detailed engineering plan, including calculations of permissible loads;
- Provide a monitoring protocol for storms, high winds, overloads and snow removal.

The qualified contractor must:

- Install big tops and tents in accordance with engineer's plans and specifications;
- Provide the site operator with guidelines regarding the use of facilities and their monitoring.

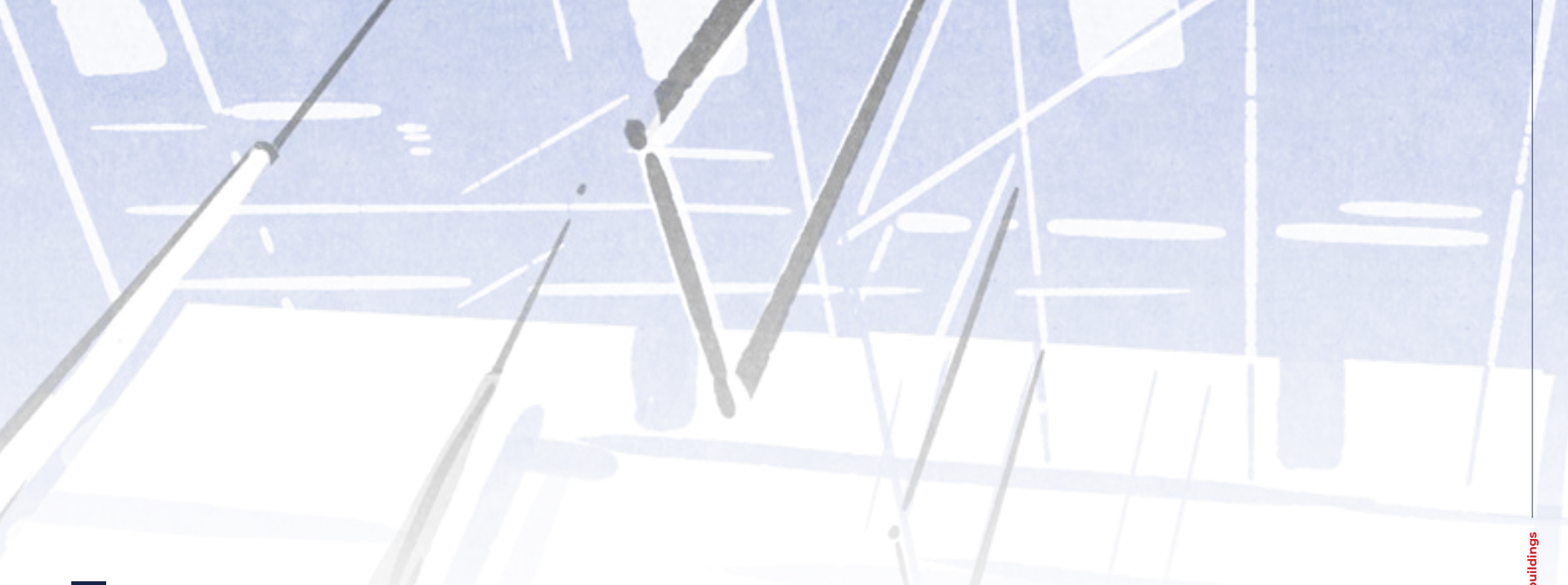
The site operator must:

- Comply with the contractor's instructions and notify the contractor if conditions of use change;
- Regularly check the condition of equipment as recommended by the contractor, as well as the behavior of installations (abnormal wear, unstable ground, loosening, etc.);
- Anticipate risk factors (weather alerts, special events with crowds, etc.);
- Plan for the procedures to follow in case of evacuation, emergency or extreme weather event.

2.10 Big Top and outdoor structures

Information & advice

- Never forget that a big top requires numerous and significant costs for set-up, tear-down, heating, supervision, installation of apparatus, bleachers, floors, etc.
- The big top forms a large training space. Additional structures are required for changing rooms, sanitary facilities, reception, etc.
- Acoustic isolation from the outside is inadequate, if not virtually non-existent.
- Thermal isolation is not ideal, and it can be very hot in summer and very cold in winter. The costs of heating in winter and air conditioning in summer are very high and difficult to control. These differences in temperature and humidity have a particularly strong influence on variations in safety features such as slippery overhead equipment for acrobats, the need to ventilate the tent, condensation accumulation, etc.
- The phenomenon of increased temperatures in the ceilings of buildings is even more significant under the canvas of big tops.
- Winter weather conditions, such as accumulations of snow, ice or black ice, may force us to suspend activities.
- Accumulated snow or ice may require specialized emergency action: snow removal, de-icing, etc.
- The techniques used to install aerial equipment are all different, depending on the specific features of the big top or structure.
- It is necessary to ensure the security of the site outside periods of use, to enable daily maintenance and prevent intrusion or damage to equipment.
- When choosing a site, it's important to consider the possible repercussions of the site's nature: flooding, prevailing winds, ground quality, seaside (saline environment), etc.



2.11 New building development

New building design should not be viewed solely from a technical perspective. Future users (technicians, teachers and project leaders) must be involved from the outset and throughout the project.

In addition, a competent circus technician and a competent or qualified pedagogical manager will be involved in the development of the project and will follow it through to completion.

To achieve a certain cohesion between the initial project and the delivery of a properly equipped building, these 2 specific contributors will be involved in:

- Project development;
- Developing up a specific budget for circus elements;
- Defining intentions and levels of practice;
- Analysis of surface area and volume;
- Project feasibility and cohesion;
- Determining the mechanical strength required for buildings and infrastructures;
- Assessment of ancillary space requirements (storage, changing rooms, workshops, etc.);
- Writing the building specifications logbook;
- Follow-up of project development stages (planning, construction, regular site visits, specific layouts and technical visits);
- Technical equipment.

2.12 Conversion of existing buildings

Transforming an existing building gives it a new lease of life and preserves traces of the past.

It should be noted that classified or historic buildings and certain other sites may be subject to protective laws or regulations regarding the exterior and interior appearance of the building. It's important to check with the relevant authorities (municipality, Ministry of Culture, heritage officials, provincial and federal governments, etc.).

As in the case of a new building, a competent circus technician and pedagogue must be involved in the project from the outset and will also monitor it through to delivery.

To achieve a certain cohesion between the initial project and the building's delivery, these 2 specific contributors will participate in:

- Project development;
- Developing a specific budget for circus elements;
- Defining intentions and levels of practice;
- Analysis of surface area and volume;
- Project feasibility and cohesion;
- Determining the mechanical strength required for buildings and infrastructures;
- Structural analysis of the building by an engineer;
- Assessment of ancillary space requirements (storage, changing rooms, workshops, etc.);
- Writing the building specifications logbook;
- Follow-up of project development stages (planning, construction, regular site visits, specific layouts and technical visits);
- Technical equipment.

For certain buildings, where rigging from the existing ceiling is not feasible, or if the structural analysis is unfavorable, a self-supporting structure independent of the building can be manufactured, on which the rigging can be attached. Mobile rigging systems can also be added.

It would be a good idea to include renovations to improve energy performance, thus reducing heating and air-conditioning costs. Improving thermal insulation generally leads to some improvement in acoustic quality.

2.13 Additional areas (storage, workshop, maintenance and changing rooms)

Equipment storage and maintenance areas are often missing from projects. They are forgotten, neglected or underestimated in the development of the project.

It's essential to provide dedicated areas and premises for the storage of specialized, expensive acrobatic equipment. This equipment is fragile when taken out of its context of use.

The large volume of training mats must be considered.

The requirement for this type of space is greater than it seems. A storage and maintenance area corresponding to ± 15% of the total surface area of the training facility is required.

Legal side

If flammable or toxic cleaning products are used, a variety of specific equipment is mandatory (safety cabinet, ventilation of glue and paint vapors, specific emergency equipment: eye shower in case of contact with chemicals, etc.). It is therefore advisable to consult qualified personnel to manage this type of storage.

Information & advice

- It's very important that, from the beginning of the process, the project leader assesses the needs and calls on a pedagogue or circus technician to evaluate the requirements for ancillary premises (surface area and volume of storage space for circus equipment, workshop, if necessary, etc.).
- The storage area must be easily accessible (access corridor, large doors, loading dock, stairwell etc.) The size and capacity of the goods lift should also be considered.
- Ideally, access to the storage room is directly connected to the training area.
- Access to the storage room is controlled and limited to authorized personnel.

Security

- Equipment is kept away from heaters or other sources of heat or direct sunlight.
- Cabinets with shelves and drawers are recommended for storing small items of equipment.
- Expensive specialized equipment (carabiners, pulleys, swivels, etc.) should be kept locked away.
- Ventilated bags or boxes are recommended for storing aerial equipment (ropes, fabrics, straps, etc.).
- Keeping an equipment inventory is required. An inventory enables better management of equipment, better budget forecasting, and more effective control and traceability.
- For the storage of natural and synthetic acrobatic equipment (rope, fabric, webbing, etc.), the storage room must be dry, well-ventilated and preferably have a constant temperature.
- For safety mats (very bulky material), vertical storage is preferable to stacking. The weight of mattresses stacked on top of each other wears them down prematurely, and foam quickly loses its memory.
- If the scale of the project demands a workshop-type maintenance area, it is advisable to call in a competent person to plan the layout (ventilation, toxic fume control, eye shower in case of contact with chemicals, etc.).
- Equipment is stored when not in use.
- An up-to-date inventory must be maintained.

2.14 Special events

A special event is an activity outside of the normal day to day activities. It can take place within the training space or at an external site or establishment.

The organization of special indoor or outdoor events may require the rental of specific equipment such as freestanding structures, tents and bleachers or other temporary structures.

Legal side

In Quebec, regulations apply to freestanding structures, tents and big tops and inflatables structures, as well as electrical installations and generators. To comply with these regulations, it is important to obtain the following documents.

An application for a non-profit or special events permit is required.

As with all activities taking place on the premises, for special events it is necessary to establish the risks and measures to be taken, by drawing up an emergency measures plan.

For electrical installations, please refer to the electrical code for temporary outdoor installations.

For more information

- Demande de permis sans but lucratif et événements spéciaux

2.14 Special events

Information & advice

For circus performances or acrobatic rigging on temporary structures, it is important to check with the manufacturer to verify they can be used for these purposes. There are a variety of regulations (federal, provincial, municipal and institutional) concerning the holding of special events in public spaces. It is advised to consult a competent circus technician specialized in this type of activity.

- The event organizer, owner or manager is the person who organizes the special event. He or she is legally responsible for it from start to finish.
- The organizer, owner or person in charge of the event is responsible for the design and implementation of the emergency measures plan.
- The event organizer must ensure that he is familiar with and applies to all relevant regulations. He will also obtain all necessary authorizations and permits.
- Use of the site must be authorized by its owner. It must be checked whether it is possible to accommodate the public, install temporary structures or stage circus performances.
- Organizers are strongly advised to take out event insurance.
- Stage and acrobatic equipment rented for these events should be validated by a competent circus technician.
- Inspect and validate the acrobatic equipment for outside performance
- It is necessary to verify the technical capacities of the performance venue and to have an up-to-date technical specification document.
- Validate site safety (surveillance, public access, backstage access, emergency access, etc..).
- Management of volunteer staff is required.
- Validate the site facilities available in the event of an outdoor event (changing rooms, toilets, sun protection, etc..).
- Thermal constraints for outdoor events (heat, cold, wind, humidity, etc.) need to be validated, especially if the event requires the installation of structures (stage, tent, big top, etc..).
- When planning an event, it's essential to carry out a specific risk analysis. The fact that there are many unknown and new elements, such as the environment, equipment and pace of work, calls for appropriate safety measures.

Inadequate risk management can alter or cancel an event, but it can also cause economic and human damage. Risk analysis is used to establish the feasibility of an event, based on clearly defined parameters. The definition of acceptable risk is the result of considering all the determining factors related to the situation under analysis. It enables us to accept or reject the residual risk identified and to apply the necessary mitigation where necessary.

It's important to ensure order, well-being, respect and supervision at this type of event. Personal safety, whether for participants or artists, must be the priority.

3 - Development criteria of spaces by discipline

3.1 Introduction

There are many circus arts disciplines, and they continue to develop and evolve. There are four main families of disciplines: floor acrobatics, aerial acrobatics, juggling and balancing. The layout criteria and equipment required are directly linked to the disciplines: lunge, adapted floor, training mats and apparatus.

In developing this guide, we have documented and prioritized the specific disciplines and techniques that are essential to meet the needs of those involved in projects to develop venues for circus training activities in schools, at leisure and in preparatory training. This implies that certain disciplines are not covered, but we identify them in this chapter as complex and out-of-context disciplines.

The complementary disciplines of the circus arts must also be considered in training and site planning: acting, dance and music. These artistic disciplines, integrated into circus arts training and practice, should be incorporated and have their own challenges and planning criteria.

3.2 Juggling

Juggling is a very popular category of disciplines. It requires a simple layout and a low investment in equipment. Beware, however, of the large number of accessories required per participant.

Juggling dates to ancient Egypt. This discipline can be practiced solo or in a group. Props are thrown in the air or against a surface. They are caught and then thrown again. A variety of props are used: rings, balls, clubs, scarves, hats etc. Juggling is often combined with other circus disciplines such as unicycle, wire, rola-bola, etc.

For more information

- École nationale de cirque - Jonglerie
- Bnf - CNAC - La jonglerie

3.2 Juggling

Discipline specificity

Criteria for the development of juggling disciplines are dictated by respect for the rules of the art, based on practice and observation. Circus arts teachers are trained to make the right choice for each discipline.

Caution

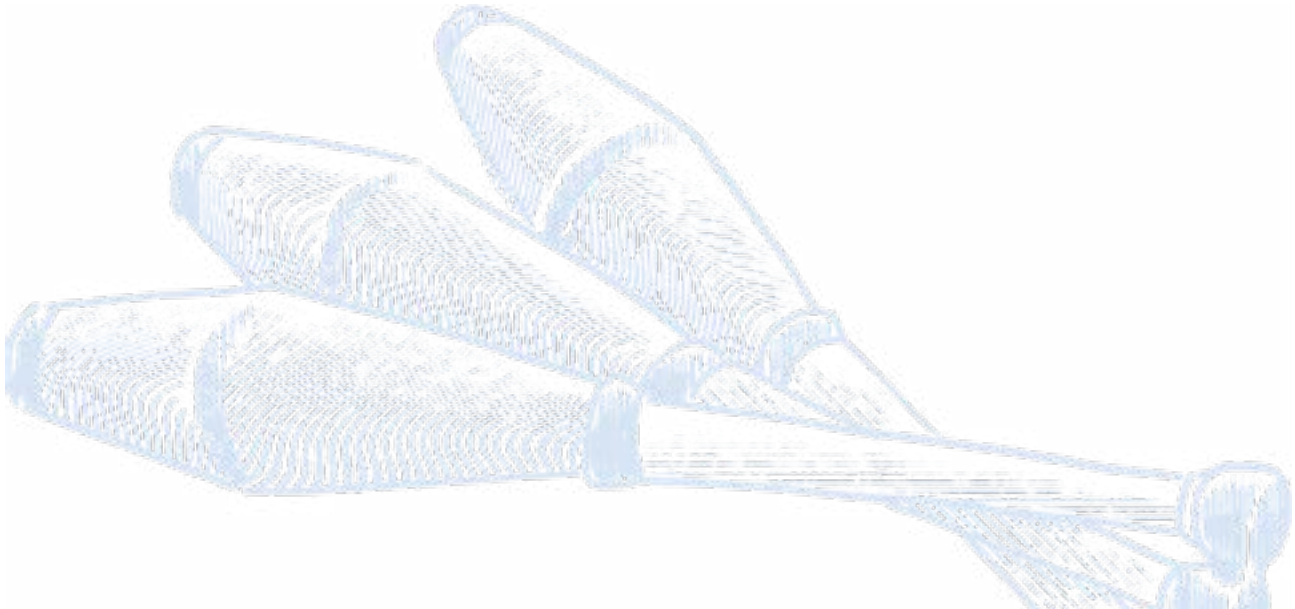
- It is strongly recommended that juggling with pyrotechnics and fire be prohibited. In the event that fire is used, a procedure approved by your local fire department is obligatory.
- Warnings also apply to juggling with sharp or concussive objects.

Budget and purchasing

For specialized juggling equipment, even if the unit cost doesn't seem high, the large number of objects required will quickly increase the budget.

Information & advice

- Juggling is a discipline that rapidly requires more and more space, especially at height, as participants progress. Three meters in height is sufficient for initiation, but the juggler will soon need more volume.
- For multi-person juggling (passing) the dimensions go from 4 to 5 meters high and 6 to 9 meters long, and more...
- For juggling combined with other disciplines such as the balance ball, unicycle, Rola-bola, etc., the volumetry needs to be adapted accordingly.
- The juggling area must be completely free of obstacles. Sufficient height is required.
- The floor space must be free of accessories such as scarves, balls, clubs, etc., as they can cause falls.
- The floor is flat, free of bumps, obstacles and thick carpet. Sports floors, dance floors and roll-up acrobatic floors are recommended.
- The quantity of material must be sufficient. Additional equipment is required, e.g. to juggle with 3 balls, you need 5 balls per person.
- Light sources are adapted and diffused indirectly. They are evenly distributed, avoiding shadows and contrasts. Juggling is a discipline where vision is important. On sunny days, windows, bay windows or any other light source should be blacked out to avoid glare.
- When not in use, equipment is equipment is stored in a special area (crates, boxes, lockers, etc.).



Overview of juggling disciplines

Rings

Along with balls and clubs, rings are traditional juggling accessories. Their finesse, precision at great heights and the ability to hold many rings in the hand make them the accessory of choice for juggling a wide range of objects. Juggling rings are available in a wide variety of models and colors and can be luminous or phosphorescent.

$ Rings: 6 $ to 30 $

Antipodism

To practice this discipline, you need a trinka (a very low, inclined triangular seat that supports the torso) or cushions under the back. Antipodists juggle with their feet, throwing and catching objects of all shapes and sizes (carpets, umbrella, rollers, tables, etc.) without using their hands. When the act is purely acrobatic, without juggling or balancing with objects, it is called icarian.

$ Trinka: 500 $ to 2 000$

Chinese plates

The Chinese plates is also known as a spinning plate. The shape of the plate is such that it can be balanced quite easily on top of a stick. The basic movement is to spin the plate at the end of the stick, balancing on its center. By spinning very quickly on itself at the end of the chopstick, the Chinese plate produces a gyroscopic effect that keeps it in balance.

$ Chinese plates: 10 $ to 40 $

Balls

One of the most accessible and widely used juggling accessories, balls can vary from 50 to 150 mm in diameter. There are soft balls, generally made of plastic or leather, filled with millet, beans, rice, sand or small beads. They're comfortable to juggle, and when they fall, they deform enough not to roll. Plastic or stage balls are hollow on the inside.

$ Balls: 5 $ to 20 $ per unit, depending on size and materials

Overview of juggling disciplines

Contact ball

A juggling discipline that involves keeping one or more glass or acrylic balls in contact and balanced on the body. Also known as "touch juggling", contact juggling is the opposite of the more traditional "throw juggling". Beware of repeated falls, which can damage the balls, storage, cost, etc..

$ Contact ball: 10 $ to 100 $ depending on size and materials (glass, crystal, acrylic) etc.)

Bouncing balls

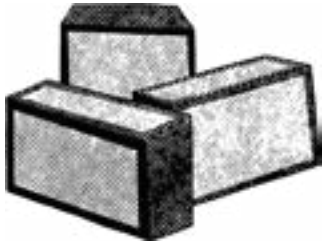
Balls for specific bouncing surfaces such as hardwood, granite, Plexiglas, etc. Beware of the cost of silicone balls, the noise of bouncing balls on floors, and uncontrolled bouncing.

$ Bouncing balls: 10 $ to 20 $ for basic balls, 50 $ to 70 $ for silicone balls

Devil sticks

Also known as a flower stick when equipped with "flowers" at the ends. This conical stick, ± 80 cm long, is launched into the air to perform various tricks. It is propelled by two other rubber-covered wooden sticks. Beware, this discipline requires a lot of space and height.

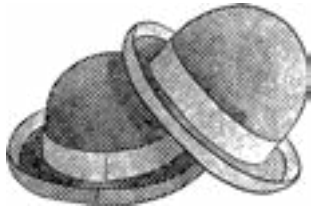
$ Devil sticks : 30 $ to 50 $



Cigar boxes

This juggling discipline allows you to develop routines based on quick manipulations and balances with boxes resembling cigar boxes. The principle is to hold a box in each hand and compress them onto a third box. There may be more than 3 boxes, depending on level. Beware of fragility in the event of repeated falls..

$ Cigar boxes : 30 $ to 50 $

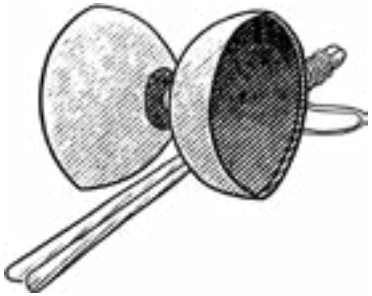


Hats

For juggling and manipulative acts these hats are specifically designed with optimal shapes and adapted materials. Their mass is greater than that of a conventional hat, to facilitate different forms of juggling. Beware of fragility during repeated falls and storage.

$ Hats: 75 $ to 150 $

Overview of juggling disciplines



Diabolo

The object is made up of two plastic caps clamped by a bolt to a shaft (metal or Teflon / with or without bearings) in the shape of a pulley groove. It is manipulated by a nylon or Kevlar thread linked by two rods. These rods, made of wood, aluminum, or even carbon or fiberglass, act as levers to transmit rotation to the diabolo. Beware: this discipline requires a lot of space and height.

$ Diabolo: 20 $ to 120 $

Scarves

The scarf is an ideal juggling accessory for beginners. Juggling scarves are very light and their fall is slowed by the air. As a result, they move slowly through the air, making them easy to handle and to learn the basic movements of aerial juggling. Scarves are generally 40 cm by 40 cm or 65 cm by 65 cm.

$ Scarves : 2 $ to 5 $

Hula hoops

Introduced and popularized in the late 50s, the hula hoop consists of twirling a hoop around the waist with a wiggle. Since its arrival as a circus discipline, its use has multiplied. It's now common to see one or more Hula hoops on other parts of the body, such as the arms, neck and legs, and even simultaneously.
Beware of fragility in the event of repeated falls, storage, etc.

$ Hula hoop: 20 $ to 200 $

Clubs

Clubs are one of juggling's oldest props, along with balls and rings. They have the peculiarity of being able to make one or more rotations in the air when thrown, making them particularly spectacular props when used for passing between jugglers.

$ Clubs: 25 $ to 150 $

3.3 Balancing disciplines

The discipline of balancing involves keeping one's own body, a partner's body or objects in balance. Balancing is performed on the ground, on a device or by moving on an object.

Discipline specificity

Criteria for the development of balancing disciplines are dictated by respect for the rules of the art developed through practice and observation over time by circus teachers and technicians.

Special attention is paid to certain disciplines. These disciplines have been identified for their specific layout and the complexity of their use of technical equipment.

The judgement of the circus arts pedagogue is used to choose the correct equipment for the appropriate discipline.

Caution

Important general warnings about safety, budgeting and purchasing equipment are documented in the introduction to the guide (see chapter 1.6 Budgeting and purchasing).

For more information

- École nationale de cirque- Équilibrisme
- BnF - CNAC - Les équilibres

3.3.1 Bicycles and unicycles

The unicycle consists of a single wheel with pedals and a saddle on which the acrobat performs various acrobatics, balances and jumps. The unicyclist can add a new level of complexity by combining other disciplines such as juggling or hand-to-hand.

For the bicycle, the acrobat performs one-wheel balances or jumps using the apparatus in an original way. In circles, this discipline is often seen as an allegory of the relationship with the horse. One type of bicycle can also be modified to accommodate several acrobats and develop group figures.

The circus bicycle has a zero-fork angle: The front wheel and handlebars turn 360 degrees. It has no brakes and has a fixed wheel bearing. Wheels are often fitted with spigots for acrobatics. Acrobatic bikes can be ridden solo, as a duo or in a group.

Information & advice

- The use of personal protective equipment (helmet, knee and elbow pads) is recommended for beginners.
- The practice area is clear of any object and has a diameter of at least 8 meters.
- A specific (rotating) lunge is optional to ensure the safety of this discipline, like all disciplines that involve riding in a circle, such as acrobatics on horseback.
- Supports (walls, dance bars, mechanical supports, benches, stepladders, etc.) used for teaching purposes must be stable.
- The floor must be suitable for bicycles and unicycles (like German wheel and Cyr wheel). Adapted sports floors should not be more than 4 to 5 mm thick.
- Please note that for group numbers, the bicycles are specific (harnesses, stirrups, toe clips and foot restraints) and the floor must be suitable to support the load.

For more information

- École nationale de cirque - Bicyclette
- BnF - CNAC - Les cycles

3.3.2 Stilts

The stilt-walking technique involves balancing and moving around on poles fitted with supports on which the feet rest. Stilts vary in height from 20 to 30 cm for beginners to 2 or 3 meters for professional stilt walkers.

Common in recreational settings, they are an excellent activity for developing children's balance without having to resort to balancing on objects. Some stilts are adjustable, others have a spring system (power skip or urban stilts) or even a compressed air system.

An educational variation called "box and string" exists for the educational discovery of this discipline.

Information & advice

- The floor is free of all objects or obstacles.
- It is necessary to install training mats around the movement area and when and when teaching certain movements.
- The thickness of the training mats or landing mats is adapted to the height of the stilts.
- Sitting areas are high and stable enough to put on stilts and stand up easily.
- Each participant has a defined practice area. This zone includes a safe distance all around and is far from the walls if they are not used to keep balance.
- The floor space is arranged according to the height of the participant and their stilts.
- Personal protective equipment (helmet, knee and elbow pads) should be always used.
- The equipment and floor are inspected before each use.
- The foot supports are properly secured and fixed. Any other fixings or adjustable bolts on the stilts are also checked.
- Walls, dance bars, Swedish ladders, benches, etc. can be used as supports to help dancers keep their balance. The strength and stability of all these adapted objects are carefully checked.
- Rubber tips are necessary because stilts can slip on certain floors or damage certain surfaces (dance floors, sports floors, etc.).

For more information

- Wikipédia - Échasses
- Bnf - CNAC - Cultures

3.3.3 Balancing

An acrobatic discipline that requires the acrobat to perform various figures and acrobatics while balancing on the hands or head, either on the ground or on different apparatus. The main apparatus used in balancing is called canes: metal rods of varying heights with round or rectangular wooden blocks fitted to the top.

Information & advice

- The floor around the platform is free of any objects or obstacles.
- If the platform is elevated, it is necessary to install landing mats around the training area.
- Each participant has a defined practice area. This zone includes a safety distance all around and is far from the walls if these are not used as a support surface.
- The equipment is inspected before each use.

For more information

- École nationale de cirque - Équilibrisme
- BnF - CNAC - Les équilibres

3.3.4 Slackline

Slackline is not strictly speaking a circus arts discipline, but a new performance proposition. It is a lot like wire, but instead of a steel cable, it's a webbing that is stretched between two anchor points. The webbing, generally made of polyester or nylon, is much more elastic than steel cable.

Information & advice

- The anchor points must support a load that varies according to weight, tension and length (between 500 kg and 1,200 kg).
- The length between two points can vary between 2 and 2,000 meters.
- Most of the ready-to-assemble tensioning strap kits sold for beginners are equipped with a ratchet strap to obtain adequate tension.
- For beginners, it is best to install a short slackline close to the ground, from 30 cm upwards.
- You can be barefoot or in shoes on the slackline.
- The use of training mats is recommended
- Equipment must be inspected before each use.
- Installation, inspection and removal of the strap must be carried out by a competent person, always following the manufacturer's instructions.
- The number of acrobats on a slackline must be determined by the teacher and the circus technician depending on the strength of the system installed.

For more information

- alpiniste.fr - Fixage d'une slackline: forces de tensions - Calcul en ligne

3.3.5 Tight Wire

Tightwire is a circus apparatus and a balancing act. The tightwire artist moves on a wire that varies in height from 30 cm to 180 cm above the ground. The wire, between 4 and 8 meters long, is stretched between two platforms. The presence of a spring is necessary at a certain acrobatic level (see technical data sheet).

Tightwire consists of a steel cable tensioned between two points. There are two possible set-ups: the cable can be attached to two points anchored to the ground, or the tightwire structure can stand on its own (self-supporting structure). The first provides greater stability and higher tension, which is necessary for advanced levels of practice. The second structure, the self-supporting has the advantage of requiring no anchor points and can therefore be set up anywhere. However, the level of acrobatics that can be performed is more limited. Gym shoes or shoes with soft leather soles should be used

The shoes used should be gym shoes or shoes with soft leather soles.

For more information

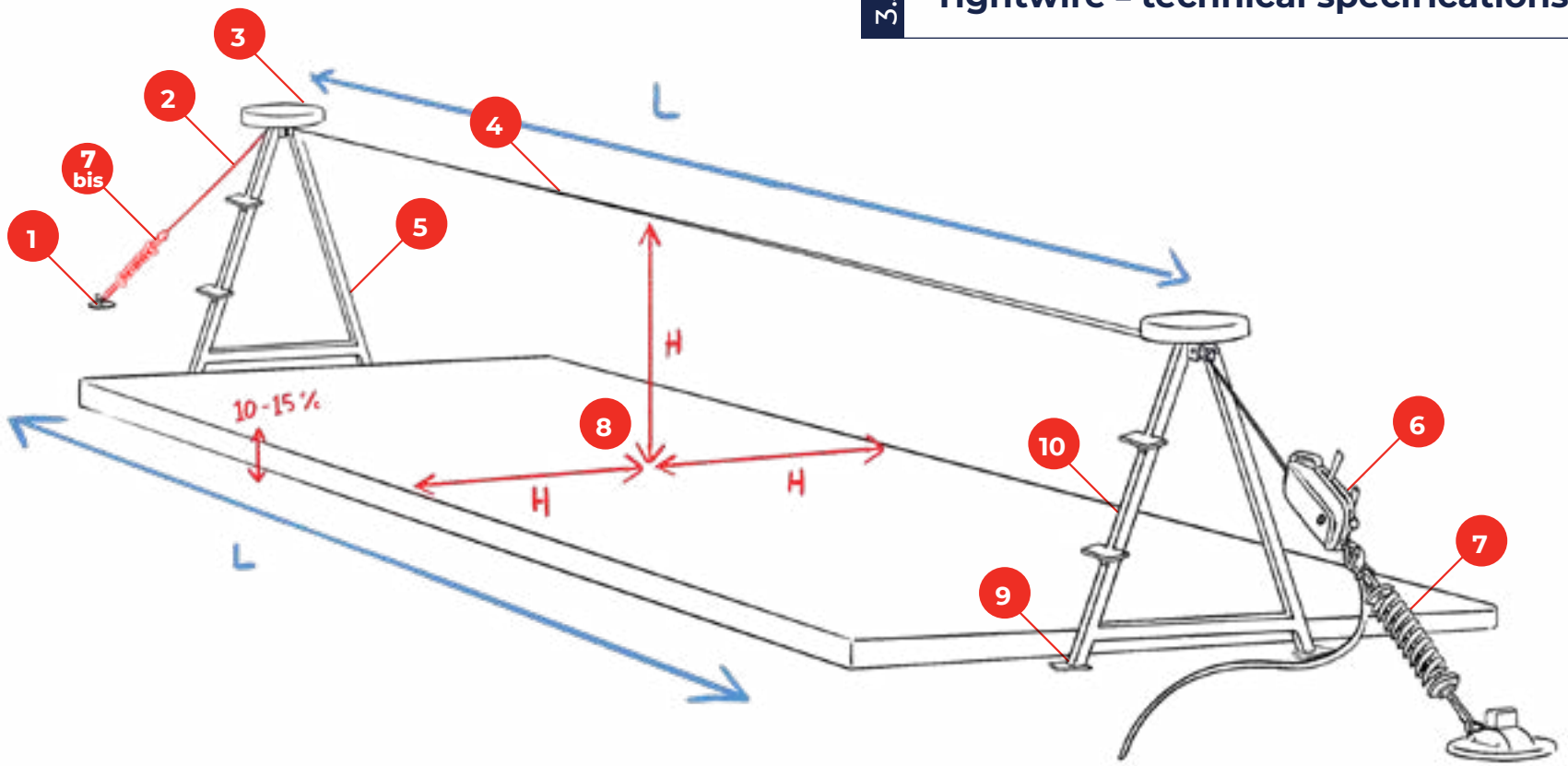
- École nationale de cirque- Fil de fer
- BnF - CNAC - Le fil tendu

3.3.5 Tightwire

Information & advice

- The tension (in a standard length -23 feet or 7 meters) tightwire cable is high, so the anchor points must be designed for this load. Some movements may require a cable tension of 1,700 kg. Anchors should therefore be designed for 2,000 kg C.m.U (Charge maximale d'utilistaion or W.L.L (Working Load Limit)
- At a certain high level of practice, especially when incorporating tempos, a spring is placed into the system between the platform and the anchor for the comfort of the user and to absorb increased end loads.
- The use of training mats is necessary.
- The length of the cable varies from 4 to 8 meters for tightwires with fixed anchors point. For tightwires with a self-supporting structure, the length is between 3 and 6 meters.
- The cable has a diameter of ± 13 mm (1/2") and it is recommended that you use anti-rotational for reasons of comfort. It is important to order your cables "degreased" at the time of purchase.
- Tensioning of the cable is carried out using a manual chain block or cable winch known as a "Tirfor" (eponymous of the brand that invented this device).
- The area around the tightwire is clear of all obstacles.
- A safety zone is required around the tightwire including the anchor points.
- A height of 30 cm from the ground is recommended for beginners. If the cable is installed higher, a teacher should be present to provide assistance.
- The tightwire may only be installed and disassembled by authorized and trained personnel.
- The tightwire cable is inspected before each use.
- The platforms are safe (no grooves, sharp corners, splinters, etc.).
- The platforms must be stable and correctly positioned.
- In the case of a self-supporting structure, it is important to ensure that it is stable and that the supplier's instructions are respected.
- Teachers are trained in hand spotting. In some cases, the use of a double lunge may be necessary.
- Additional users on the same tightwire at the same time must be verified by the teacher and the circus technician in regard to the suitability of the rigging components and anchor points.

Tightwire – technical specifications



1. Anchor plates with a C.M.U. (W.L.L) of 2 t. (the load can reach 1.7 t).
2. Guy wires with an angle of 25° minimum to 45° maximum.
3. Wooden platform +- 35 cm in diameter.
4. Anti-rotational degreased cable generally of +-13 mm (1/2") diameter.
5. « A» frame, generally made of steel, 30 to 180 cm high.
6. Cable or chain hoist. (regular inspections should be carried out according to manufacturer's guidelines).
7. Spring: essential if there are jumps or dynamic loads. To be installed before or after the winch or hoist or on the opposite guy wire.
8. Training mats with a thickness equivalent to 10 to 15% of the height of the wire, the length of the wire and a width equivalent to +- 2 times the height of the wire.
9. Load distribution plate. The load can be up to +- 600 kg per foot.
10. Access steps, the number of which depends on the height of the «A» frames.

3.3.7 Rola-bola

Also known as the "balancing board", this discipline, in its simplest form, consists of a board on a cylinder on which one person stands. The acrobat moves the board from right to left. The balance point shifts as the cylinder rolls under the board. With a little practice, balancing on a rola-bola is not difficult, but it is an exercise that needs to be carefully supervised.

Information & advice

- The diameter of the tubes varies from 15 to 20 cm in diameter by 25 cm in length, depending on the level of the users.
- The board measures 20 to 25 cm wide by 60 to 70 cm long.
- Two wooden strips can be fitted under each end of the board to prevent it rolling off its roller in the event of imbalance.
- The floor is free of all objects or obstacles.
- A carpet or mat can be placed under the roller to better control its rotation.
- It is necessary to install training mats around the area when teaching certain movements.
- Each user has a defined practice area. This zone includes a safety distance around it and is away from the walls.
- Personal protective equipment (helmet, knee and elbow pads) can be used at the beginning of the program for beginners.
- The equipment is inspected before each use.

For more information

- Wikipédia - Plateau d'équilibre

3.3.8 German wheel

A wheel composed of two large metal circles linked by crossbars inside which the acrobat performs. Using their own momentum, the acrobat moves in straight line or can execute rotations.

Ranging between 165 cm and 220 cm in diameter, it is made of two metal tubes approximately 4.5 cm in diameter and covered with a coating usually made of PVC. A smooth, adherent floor, within a minimum space of 6 to 8 meters in diameter, is recommended, but the student will quickly need a larger space.

Information & advice

- The size of the wheel is chosen in relation to the height of the participant and is 20 to 40 cm larger than the user.
- The floor is made of a resistant, smooth and flat material. There are no obstacles in the way and the practice area is well defined.
- It is preferable to have a non-slip surface as a floor covering.
- The practice surface has at least one or two times the full rotation of the wheel in length.
- The ceiling height is at least 5 metres to allow the acrobat to stand upright on the wheel.
- The wheels must be stored in a large area so that they can be immobilized, for example, using wheel chocks.
- The wheel's bolts, connections and welds are visually checked periodically and before each use.
- Foot straps, joints and welds are also inspected for damage.
- Bolts, replacement screws, and maintenance tools are easily accessible.
- The German wheel can be very large. It should be used in a place close to where it is stored and with access of a suitable height.

For more information

- École nationale de cirque - Roue allemande
- BnF - CNAC - Roues et structures

3.3.9 Cyr wheel

The Cyr wheel is an acrobatic apparatus consisting of a simple circular tubing resembling a large hoop. Because of its structure, it allows for great fluidity of rotations, creating a unique dynamic.

Generally, from 165 cm to 220 cm in diameter, it is made from a metal tube 4 to 5 cm in diameter and is covered with a coating, usually PVC. A smooth, adherent floor in a space 6 to 8 meters in diameter is recommended, but the student will soon need a larger space.

Information & advice

- The size of the Cyr wheel is chosen according to the height of the participant and is 10 to 15 cm larger than the user (the height of a closed fist).
- The floor is hard, smooth and flat. It is free of any obstacles and the practice area is well defined.
- It is preferable to have a non-slip surface as a floor covering.
- Wheel section bolts and connections are inspected regularly and before each use.
- Easily accessible replacement bolts and maintenance tools.
- There must be a place to store the wheels so that they can be immobilized. Hooks on the wall, for example, can be used. The hooks must be sufficiently solid and the load capacity clearly identified.

For more information

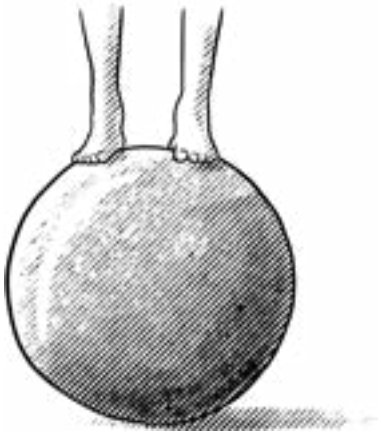
- École nationale de cirque - Roue Cyr
- BnF - CNAC - Roues et structures

Overview of balancing disciplines

Acrobatic bike

An adapted bicycle on which the acrobat performs tricks on two wheels or on the rear wheel in a wheelie. The apparatus allows them to turn, twirl, balance on the saddle or handlebars and rotate the handlebars 360 degrees. The floor must be smooth and non-slip. The use of a lunge is recommended during the learning process.

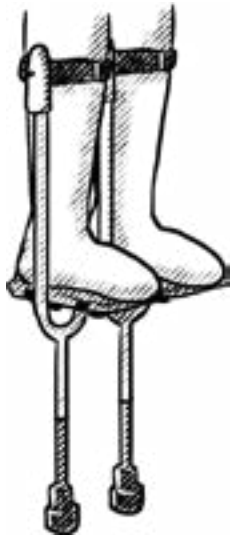
- $ Bicycle 2 000 $ to 4 000 $



Balance balls

A hard, heavy sphere of various diameters, the acrobat stands in equilibrium, moves around and performs acrobatics or juggles on this ball. The smaller the diameter, the more maneuverable the ball and the greater the difficulty. The ball must be used with care and under supervision. The floor must be smooth and non-slip. The acrobat must wear shoes that grip well. A lunge may be used.

- $ Balance balls 500 $ to 1 000 $ depending on size (with base and storage bag)



Stilts

Made of wood or aluminum and available in various heights, stilts are excellent pedagogical tools. They are equipped with a footrest and straps to secure the legs. The acrobat maneuvers on the stilts making small adjustments where necessary to maintain balance. There are now urban stilts equipped with springs and even compressed air that allow running, jumping, and performing acrobatics. A smooth, even, and adherent floor in a sufficiently large space is necessary.

- $ Stilts kit: 100 $ to 200 $
- $ Urban stilts: 500 $ to 800 $
- $ "Fournales" compressed air stilts: up to $4,000

Acrobatic ladder

A discipline practiced on a ladder of varying heights. The acrobat balances by moving back and forth from one leg to the other. Ladder balancing can be combined with acrobatic figures and juggling. The floor must be smooth and non-slip. A lunge can be used, depending on the level and the tricks performed.

- $ Acrobatic ladder: 600 $ to 1 500 $ (depending on size and finish).

Overview of balancing disciplines

Handstand

An acrobatic discipline in which the acrobat performs various figures while balancing on his hands or head. The act can be performed on the floor, on "canes", blocks or on apparatus (chairs, tables or adapted base). The floor must be level, and the apparatus must be stable. When balancing on high apparatus, a lunge must be used.

- $ Base with « canes» 400 $ to 2 000 $
- $ Wood block: 30 $ to 60 $

Slackline

Slackline is a new acrobatic technique that involves balancing on a webbing of varying widths and stretch. The tension of the webbing is less than that of tightwire, allowing other types of movement. The webbing can be set up in many outdoor locations, for example between two trees. Training mats are placed under the slackline in case the acrobat falls.

- $ Slackline: 150 $ to 200 $ (without floor anchors)
- $ $ Self-supporting structure: 500 $ to 1 000 $ by length.

Tightwire

This discipline is performed on a steel wire tensioned at a height (from 30 to 180 cm) between two A-shaped platforms. The acrobat performs a series of figures, balances, dance steps, jumps and so on. The installation of the wire requires very strong anchors (± 2,000 kg WLL or CMU). Training mats are placed under the wire in case the acrobat falls. The acrobat can use a fan to help them keep their balance,

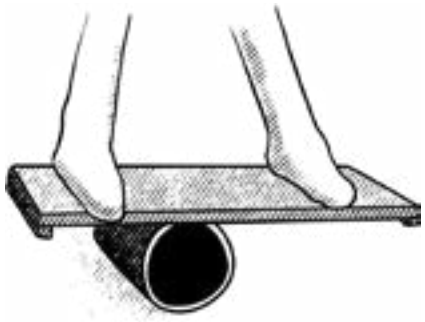
- $ Full kit : 4 000 $ to 5 000 $ (without floor anchors)
- $ Spring : 400 $ to 1 000 $ according to resistance
- $ « A» frame : 1 000 $ to 2 000 $
- $ Tight wire : Non rotating cable 12 mm degreased : 300 $ to 600 $ according length
- $ Tirfors (CMU 2 000 kg) : 1 000 $ to 2 000 $
- $ Chain block : de 500 $ à 800 $
- $ Free standing structure: 800 $ to 3 000 $ (depends of the height)

Slack wire or rope

A discipline involving balancing on a wire or a rope with less tension than a tightwire. Despite the lower tension, the anchors must withstand between 200 and 900 kg depending on the type of acrobatics performed. Training mats are placed under the wire or rope in case the acrobat falls. Note: the "A" frames are different from those of a tightwire.

- $ Kit : 500 $ to 1 000 $

Overview of balancing disciplines



Unicycle

This apparatus, which can vary in height, has a single wheel, no handlebars and a saddle. From 1.5 meters upwards, it is called a "giraffe". The ground surface depends on the type of unicycle, as there are now special cross-country and trial unicycles. Acrobat can combine unicycling with juggling.

- $ Unicycle: 150 $ to 500 $ depending on size
- $ "Giraffes" and professional models: 500 $ to 3 000 $

Rola-bola

Rola-bola, also known as rolla bolla, rolo bolo, roly boly, American roll or balance board, is a discipline that involves placing a board on a cylinder and balancing on it. Cylinders and boards can be stacked, and balancing and juggling can be combined. The practice area must be kept clear, as the board tends to be projected outwards when it falls.

- $ Rola-bola: 120 $ to 200 $ depending on the diameter of the rolls and the length of the boards.

German wheel

German Wheel consists of two large metal circles with a PVC cover linked by crossbars, two of which are fitted with handles and two with foot supports. Two other handles follow the circumference of the wheel. The acrobat performs acrobatics by rolling or rotating the wheel. A level, non-slip floor in an area 6 to 8 meters in diameter is recommended for beginners

- $ German wheel: 1 500 $ to 4000 $ depending on the model.

Cyr wheel

Ring made of a metal tube with a PVC cover. The acrobat uses his own propulsion to perform acrobatics by rolling and spinning the wheel. The size of the wheel varies from 1.5 to 2 meters, depending on the acrobat's height. A level, non-slip floor in an area 6 to 8 meters in diameter is recommended for beginners.

- $ Cyr Wheel: 800 $ to 2000 $ depending on the model

3.4 Floor acrobatics

Floor acrobatics is a very old discipline that combines strength and agility. It consists in the execution, mainly on the ground, of a sequence of static or dynamic acrobatic movements by acrobats in solo, duo or group performances, with or without apparatus.

For more information

- École nationale de cirque - Acrobatie au sol
- BnF – CNAC – Acrobatie au sol

3.4 Floor acrobatics

Disciplines specificity

The design criteria for the floor acrobatics disciplines are dictated by respect for the rules of the art derived from practice and observation. We present general information and advice for all these disciplines.

Particular attention was accorded to the trampoline and trampoline wall disciplines. These activities have been identified because of their specific nature in terms of venue design and the complexity of their use as technical equipment. Trampolining has its own standards, derived from the gymnastics federations, and we have drawn inspiration from them.

The judgement of the circus arts pedagogue is used to choose the correct equipment for the appropriate discipline.

Budget and equipment acquisition

The cost varies according to the disciplines chosen. Specially adapted floors and training mats represent a certain cost but are equivalent to the costs required to equip a sports gymnasium, given that a lot of similar sports equipment is used.

The cost of purchasing the equipment for a lunge (rope, pulleys, connectors and belt) and its installation by a circus technician represents a significant cost that should not be overlooked and should be included in the budget.

Advice on the purchase of apparatus and circus equipment

Although the manufacturing standards of certain sports federations can be used as a basis for certain disciplines, there are currently no standards for circus equipment.

Considering this observation, particular attention must be paid to the choice of equipment and acrobatic apparatus.

Acrobatic apparatus from different sports federations should not be confused with so-called 'leisure' or 'recreational' apparatus aimed at the general public.

Special caution should be applied to "low-cost" equipment from unverified suppliers widely available on the internet.

As mentioned in Chapter 1.6 – "Budget and equipment acquisition" with regards to "leisure circus» the use of "leisure equipment" cannot be used in circus training.

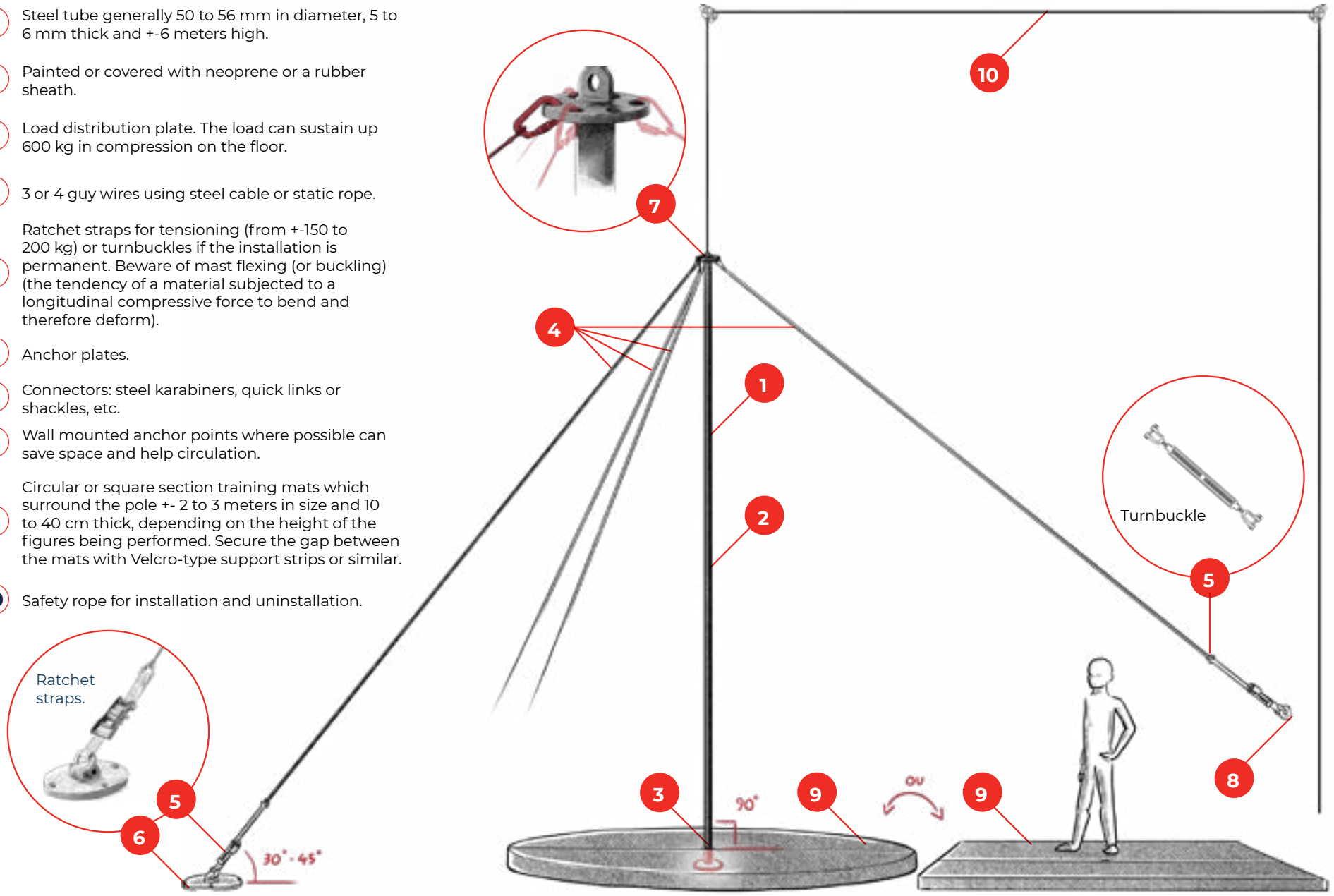
3.4 Floor acrobatics

Information & advice

- The space reserved for this activity is free of all obstacles (on the ground and in the air) up to a sufficient height.
- Depending on the syllabus and the disciplines practiced, the volume, space and work area are defined and determined accordingly by the teacher.
- The choice of floor and training mats should be decided by the teacher according to the program and the disciplines practiced (dance mats, sports mats, roll-up acrobatic floor, etc.). For more information, see Chapter 3.7 - Adapted floors, floor coverings and training mat.
- The condition of the mats is checked regularly (wear, tears, Velcro adhesion, condition of the cover, handles, etc.). Repairs are planned, if necessary, to maintain this safe and costly equipment.
- A lunge system can be used for certain movements. Lunges should only be used by competent and trained personnel. For more information, see Chapter 3.6 – Lunges.
- Outside activity or training periods, equipment must be stored in a dedicated area that does not obstruct practice areas, passageways or emergency exits.
- As acrobatics is a discipline where spatial vision is essential, light sources must be adapted and diffused without being direct. They should be evenly distributed, avoiding shadows and contrasts.
- On sunny days, make sure that windows, bay windows or any other natural light source are managed to avoid glare.

Chinese pole – technical specifications

1. Steel tube generally 50 to 56 mm in diameter, 5 to 6 mm thick and +-6 meters high.
2. Painted or covered with neoprene or a rubber sheath.
3. Load distribution plate. The load can sustain up 600 kg in compression on the floor.
4. 3 or 4 guy wires using steel cable or static rope.
5. Ratchet straps for tensioning (from +-150 to 200 kg) or turnbuckles if the installation is permanent. Beware of mast flexing (or buckling) (the tendency of a material subjected to a longitudinal compressive force to bend and therefore deform).
6. Anchor plates.
7. Connectors: steel karabiners, quick links or shackles, etc.
8. Wall mounted anchor points where possible can save space and help circulation.
9. Circular or square section training mats which surround the pole +- 2 to 3 meters in size and 10 to 40 cm thick, depending on the height of the figures being performed. Secure the gap between the mats with Velcro-type support strips or similar.
10. Safety rope for installation and uninstallation.



3.4.2 Trampoline

The trampoline is an elevated resilient webbed bed supported by springs in a metal frame. This gymnastic discipline involves acrobatic jumps at considerable heights. Trampolining is a discipline within the circus arts and is widely used for its important pedagogical contribution to the development of spatial orientation.

Legal side

Sports Québec and Gymnastique Québec have established standards for the use of trampolines. Official documents from these organizations specify the dimensions of the frame, the canvas, the method of attaching the canvas and padding. When purchasing a trampoline, make sure it meets these standards. Consult your Local Gymnastic organization for current standards.

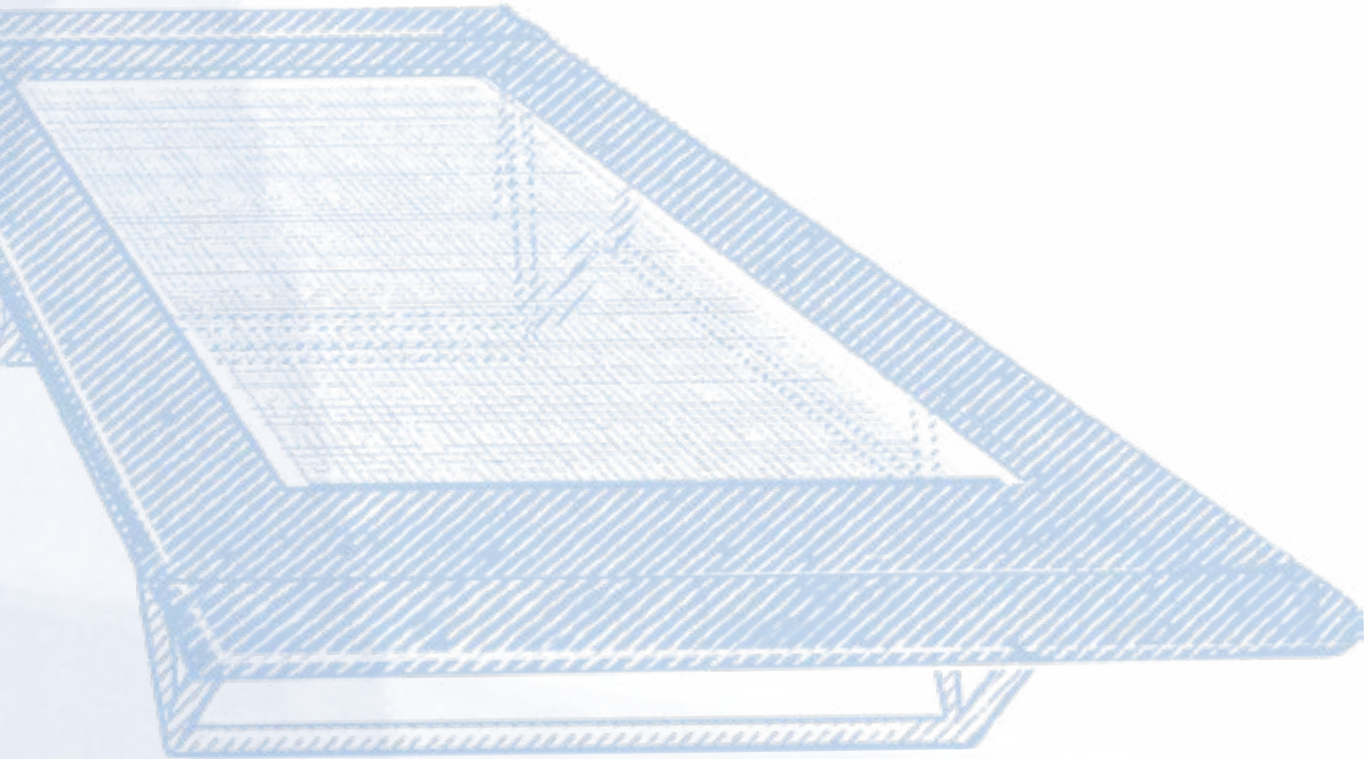
For more information

- Gymnastique Québec - Trampoline
- Fédération Internationale de gymnastique - Normes des engins - Edition 2011
- Gymnova
- Rebound
- Spieth Anderson

3.4.2 Floor acrobatics – Trampoline

Caution

For trampoline maintenance, it is advisable to change the springs alternately (1 in 3), depending on the frequency of use, rather than changing them all. Replacing all the springs radically changes the behavior of the bed.



Information & advice

- Opening and closing trampolines requires a minimum of knowledge, and training is recommended as handling them is dangerous.
- For trampolines that are folded between uses, only authorized persons may assemble and dismantle them.
- The space underneath the trampoline must be free of any objects.
- Access to the trampoline is restricted when it is not in use or when it is unsupervised.
- A visual inspection of the bed and the springs should be carried out on a regular basis.
- The number of springs recommended by the manufacturer must be maintained.
- The space above the trampoline is clear of any obstacles. The International Trampoline Federation suggests a height of 8 meters for this apparatus.
- The protective mats on the frame and springs are well maintained and in good condition.
- It is recommended to have safety platforms at the ends of the trampoline, equipped with their own mats.
- A double lunge system can be installed above the trampoline to train certain movements, depending on level.
- The area around the trampoline should be clear and spacious allowing the teacher to work safely. For example, the teacher may need to use a throw mat for a particular acrobatic movement or in case of an unexpected exit from the trampoline.

3.4.3 Trampoline-wall

A circus variant of the trampoline is the trampoline- wall This involves placing a wall with a high platform next to a trampoline. The acrobats launch themselves from the platform, then bounce off the trampoline bed and run along the wall, guiding themselves with their hands or feet.

Information and advice

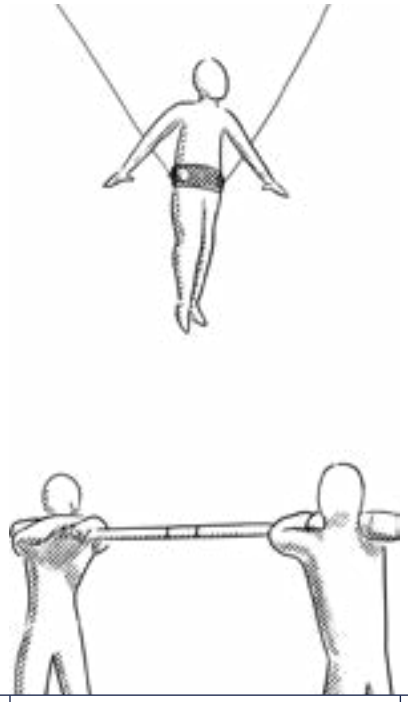
- The wall and platform must be able to support the implied loads. The wall must be designed and installed by a competent person.
- The wall and trampoline are stable and static once installed.
- It is advisable to install safety railings on the sides of the platform that are not used for acrobatic access to the trampoline bed.
- Access to the platform, wall and trampoline are secured when the trampoline-wall is not in use or when it is unsupervised.
- When the wall reaches above a certain height (5 to 6 meters) and depending on the acrobatic level a greater level of clearance underneath the trampoline is recommended. Consult competent circus technician on how this can be achieved.
- For beginners in this discipline a wall significantly lower than standard height should be considered.

Overview of floor acrobatics

Banquine and acrobalance

These disciplines require a suitable work surface and training mats. Depending on the level of proficiency of the students a lunge is also required for ongoing progression.

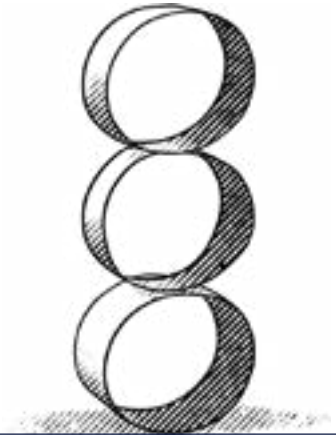
- $ No special equipment required except magnesium



Russian bar

Single, double or triple, made from pole vaulting poles. This discipline requires a suitable work surface, training mats. Depending on the level of proficiency of the students a lunge is also required for ongoing progression.

- $ Simple barre : 500 $ to 1 000 $
- $ Double barre : 1 000 $ to 1 500 $
- $ Triple barre : 1 500 $ to 3 000 $



Hoop diving

Or Chinese hoops, made of wood, plastic, "physitube" or formwork tube. They are fitted with Velcro tape or magnets. This discipline requires a suitable work surface and training mats.

- $ Hoops : 50 $ to 500 $ depending on materials

Icarians

Or Icarian Games is a discipline similar to antipodism, but with another acrobat. This discipline requires a trinka (adapted chair) and training mats. Depending on the level of proficiency of the students a lunge is also required for ongoing progression..

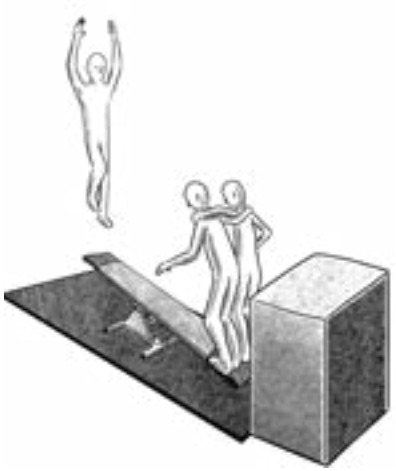
- $ Trinka : 500 $ to 2 000 $

Hand to hand

These disciplines require a suitable work surface and training mats. Depending on the level of proficiency of the students a lunge is also required for ongoing progression.

- $ No special equipment required except magnesium

Overview of floor acrobatics



Chinese pole

Made of a steel tube 3 to 6 meters high and ± 50 mm in diameter. The tube is covered with an anti-slip material (PPT tape, neoprene, rubber hose or simply painted). A "section mat " which surrounds the pole at its base is recommended. A lunge is necessary for certain acrobatic maneuvers.

- $ Chinese pole : 1 500 $ to 3 000 $ depending on height and covering (paint, neoprene or rubber).

Teeterboard (*Bascule* or Hungarian)

A collective act in which one or two acrobats jump from a tower onto a teeterboard to propel an acrobat standing at the other end of the board. This discipline requires a suitable work surface and training mats. Depending on the level of proficiency of the students a lunge is also required for ongoing progression.

- $ Teeterboard : 2 000 $ to 4 000 $

Teeterboard (Korean)

A collective act in which one or two acrobats jump from a tower onto a teeterboard to propel an acrobat standing at the other end of the board. This discipline requires a suitable work surface and training mats. Depending on the level of proficiency of the students a lunge is also required for ongoing progression.

- $ Teeterboard: 4 000 $ to 6 000 $

Parkour

Parkour (PK) or free running is a new acrobatic discipline that involves overcoming urban or natural obstacles using fast, agile movements (running, jumping, climbing, balancing, etc.) and without the aid of equipment.

- $ No special equipment required

Trampoline and Trampoline-wall

This discipline requires significant equipment: the trampoline. Is preferably installed with its extensions and training mats. Depending on the level of proficiency of the students a lunge is also required for ongoing progression.

- $ Trampoline: 10 000 $ to 20000 $ (New or used)
- $ Wall: 3 000 $ to 10 000 $

3.5 Aerial disciplines

Discipline specificity

The disciplines of aerial acrobatics are popular in circus arts training and pose particular challenges. They require the rigging of aerial equipment and apparatus. Participants in these disciplines may be exposed to risks similar to working at heights.

A progression in safety measures should be implemented during the practice of these disciplines. Adequate ground-based training, with training mats and with spotting techniques by the pedagogue should be applied before using a lunge that requires a certain height to be effective.

In cases where the use of a lunge proves to be ineffective, the placement of an effective training mat in conjunction with the spotting technique should be applied.

The type and level of protection to be used (Training mats, spotting techniques and safe working height) should be decided by the pedagogue.

3.5 Aerial disciplines

Legal Side

For the practice of aerial disciplines in Quebec, there are no standards or laws. However, the rules of the art and best practices are applied by recognized training organizations. Competent circus technicians rely on the selection and fabrication of equipment that meets industrial or sports standards for each component, such as for lifting and material strength. For more information, consult chapter 3.7 - Adapted floors, floor coverings and training mats.

With regard to the safety of aerial acrobats in their work at height, we refer to the directive of the French Labor Code. This is a unique case concerning the practice of circus arts. This text addresses professional situations of work at height of more than 5 meters. This rare reference should not be used or applied in a recreational, school, or preparatory training context. However, whenever spotting with the use of a training mat cannot be correctly done, a lunge belt and lunge must be used.

Extracts from the French labor code of September 12, 1960:

Article 1 - [...] For aerial acrobatics, where the performers are more than 5 m above the ground and, in addition, must perform releases, i.e. lose contact at certain times with either a piece of equipment or a partner.

Article 2 - Prior to any aerial acrobatics act (or any rehearsal of such an act), as defined in article 1, companies must install a protective net, securely fastened to the superstructure of the premises where the performances or rehearsals take place. A foam mat adapted to the height of the fall is also acceptable.

Article 3 - Should it prove impossible to install the safety net referred to in article 2 correctly. During their work, artists must wear a safety belt connected by a lunge to a fixed point on the building's superstructure.

Information and advice

- Installation and maintenance of aerial equipment are carried out by competent personnel.
- Before installing a rigging point in the roof structure or a ground anchor it's necessary to ensure that the structure can support the dynamic loads generated by the disciplines. This analysis of mechanical strength must be carried out by an engineer.
- Rigging equipment, acrobatic equipment and structures are inspected regularly by qualified personnel. An inspection log is kept up to date.
- Appropriate rigging and aerial equipment is preferred and should be used and must:
  - Have traceability and a known history.
  - Comply with a Safe Working Load (S.W.L) or a Minimum Breaking Strength (M.B.S) or a Breaking Load (B.L) or a Charge Maximale d'Utilisation (C.m.U) or (C.R) Charge de rupture.
- All equipment used for acrobatic installations that is defective, damaged, or expired must be identified as such and destroyed before being disposed of (or recycled if the materials allow).
- The practice area is clear of all obstacles. A safe distance must be maintained around this area. No traffic is allowed under or too close to overhead equipment.
- Aerial equipment is inspected before each use.
- Training mats and other safety equipment are available and used correctly.
- The right height (ratio between the height of the acrobat, the apparatus taught, the "move" to be performed and the type of lunge) is an important factor to calculate for safety.
- Teachers are competent and/or trained to oversee this type of practice.
- For information and advice on lunge, please refer to Chapter 3.6 - Lunges.

Overview of aerial disciplines – (Single point rigging)

Aerial hoop

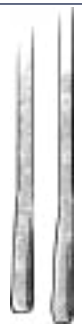
The hoop is a circular metal aerial apparatus of variable diameter (depending on the length of the participant's torso), attached by one or two ropes, in which acrobatic movements are performed. The hoop can be fixed or swinging, used at height up or close to the ground. When used close to the ground, the hoop enables the acrobat to perform propulsions with the feet, choreographic movements, variations in speed, etc.

- $ Aerial Hoop: 300 $ to 500 $
- $ Rope with wire and swivel: From 150 $ to 400 $
- $ Rig material: 20 $ to 70 $

Rope or *corde lisse*

Aerial apparatus consisting of a stranded, sheathed or braided cotton rope 2 to 3.5 cm in diameter, on which the acrobat performs various acrobatic figures. The rope can be fitted with a hand loop or "staffe" (a loop of rope or webbing), enabling the acrobat to insert either hand or foot, and then perform a variety of rotational tricks. Movement can be performed by an assistant on the ground.

- $ Rope : 500 $ to 750 $ depending length and type
- $ Rig materiel with swivel : 150 $ to 400 $
- $ Miscellaneous : 20 $ to 70 $



Aerial straps

Apparatus consisting of 2 webbing straps on which the acrobat performs various movements by wrapping his wrists, arms and legs around the straps. Both straps are attached to the single point incorporating a rigging plate and swivels. Straps incorporating a loop for inserting feet or hands require a sliding "stopper "to safely lock the acrobat's hands when performing certain movements.

- $ Straps : 250 $ to 500 $ depending length and type.
- $ Rigging plate with 3 swivels and material rig : 500 $ to 1000 $

Aerial silk

Or tissue is an apparatus consisting of a large fabric folded in half to form two sections suspended vertically at a single point, from which the acrobat suspends, wraps and contorts himself to perform various acrobatic tricks and figures. Like the straps, the fabric allows the acrobat to perform large rotations above the floor.

- $ Silk : 150 $ to 500 $ depending length and type
- $ Rig materiel with swivel: 150 $ to 400 $
- $ Rigging material: 75 $ to 100 $

Dance trapeze

The dance trapeze is suspended by a single attachment point at a height that often varies during the presentation. It's very similar to aerial hoop, with work close to the ground enabling variations in speed and propulsion. The acrobat performs acrobatic and choreographic movements.

- $ Danse trapeze: 750 $ to 1 000 $

Complementary observation: For all these disciplines, the apparatus can be manipulated on the ground by an advantage system controlled by a teacher or technician, adjusting the height accordingly. The performer will be able to do wide, rotating movements while executing acrobatic figures. While 4 to 6 meters are sufficient for beginners, these disciplines are best practiced between 8 and 10 meters. Note that these practices require a large amount of space and training mats or a lunge.

Overview of aerial disciplines – (Double point rigging)

Cloud swing

Apparatus consisting of a ± 9-meter-long rope attached at both ends to form a swing. The acrobat performs a series of movements, rotations and other aerial acrobatics. A spreader bar with bearings is essential for swinging. Beware, this is a large apparatus: the spreader bar is 3 to 4 meters wide and ± 9 meters high. Note that this discipline requires a lunge.

- $ Cloud swing: 500 $ to 1 000 $
- $ Spreader bar: 2000 $ to 3 000 $
- $ Lunge: 1 000$ to 2 000 $

Aerial Cradle

Fixed apparatus consisting of a rectangular metal frame designed to accommodate a "flyer " and a "catcher». The aerialist, who performs acrobatic figures, is supported and caught by the catcher, who is suspended by the bend of the knees.

The aerial frame can be suspended and guyed or installed on a self-supporting structure on the ground.

- $ Cradle: 500 $ to 2000 $ depending on model
- $ Lunge: from 1 000 $ to 2 000 $
- $ Rigging material: 500 $ to 10 000 $
- $ Free standing structure: 2 000 $ to 4 000 $

Russian cradle

Also known as a Korean cradle, the Russian cradle is a suspended and guyed apparatus or is installed on a free-standing ground structure composed of a frame equipped with side platforms. A performer "the catcher" stands upright and is attached by the waist to the frame. This position allows the "catcher" to swing the aerial acrobat who performs various aerial acrobatics. This apparatus is sometimes combined with flying trapeze installations.

- $ Frame: 500 $ to 2000 $ depending on model
- $ Lunge: 1 000 $ to 2 000 $
- $ Rigging material: 500 $ to 10 000 $
- $ Free standing structure: 2 000 $ to 4 000 $

Swinging trapeze

Discipline using a trapeze suspended at height from a spreader bar with bearings. The acrobat takes large swings performing various acrobatic figures, including twists and summersaults. Trapezes are generally between 3 and 4 meters long. Initiation is possible under 8 meters, but a minimum of 9.50 meters is required for safe operation (see technical data sheet). Note that this discipline requires a lunge.

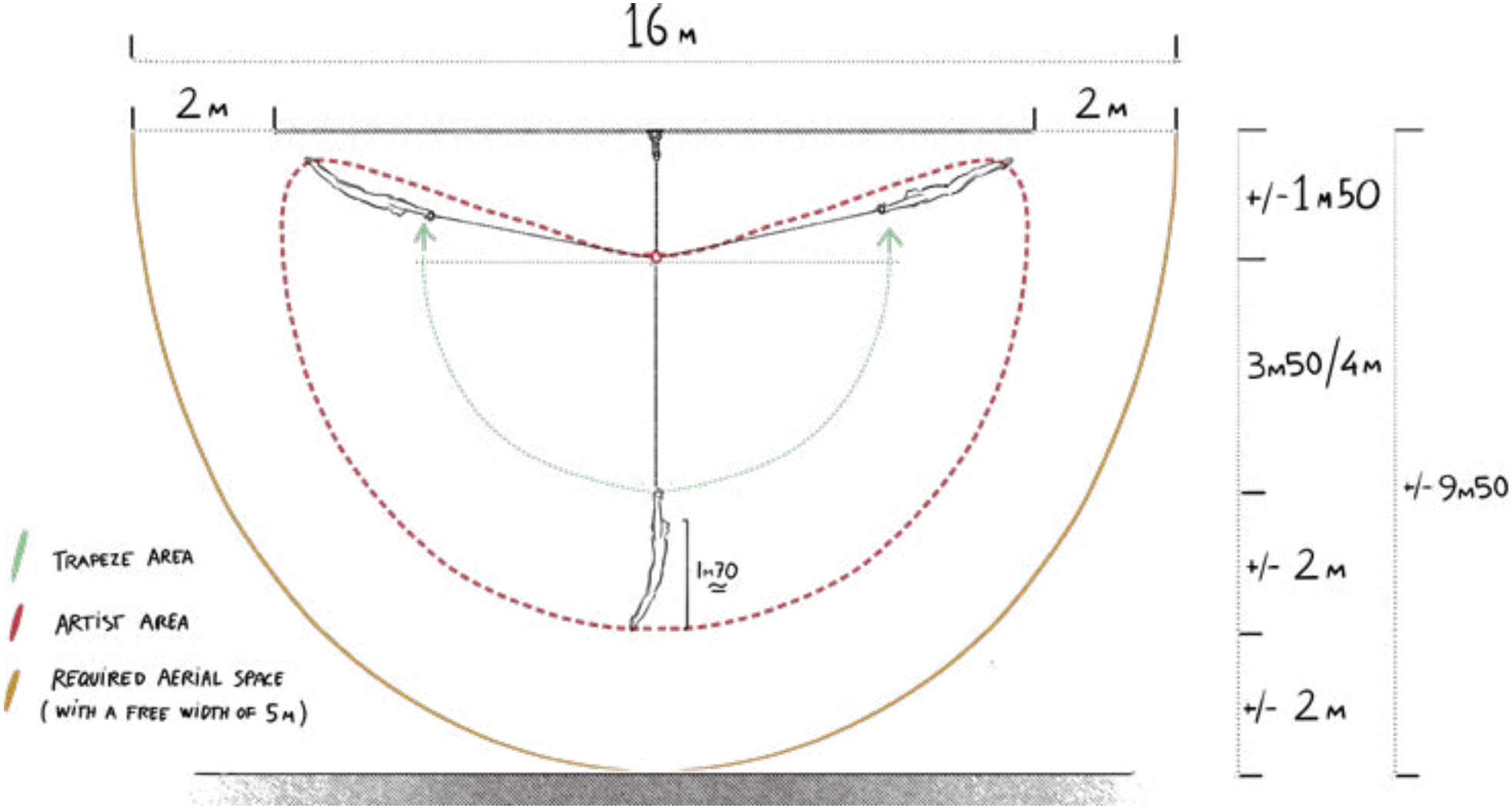
- $ Trapeze: 600 $ to 1500 $ depending on model
- $ Spreader bar : 1500 $ to 3 000 $
- $ Lunge : de 1 000 $ to 2 000 $
- $ Rigging material: 300 $ to 500 $

Fixed trapeze

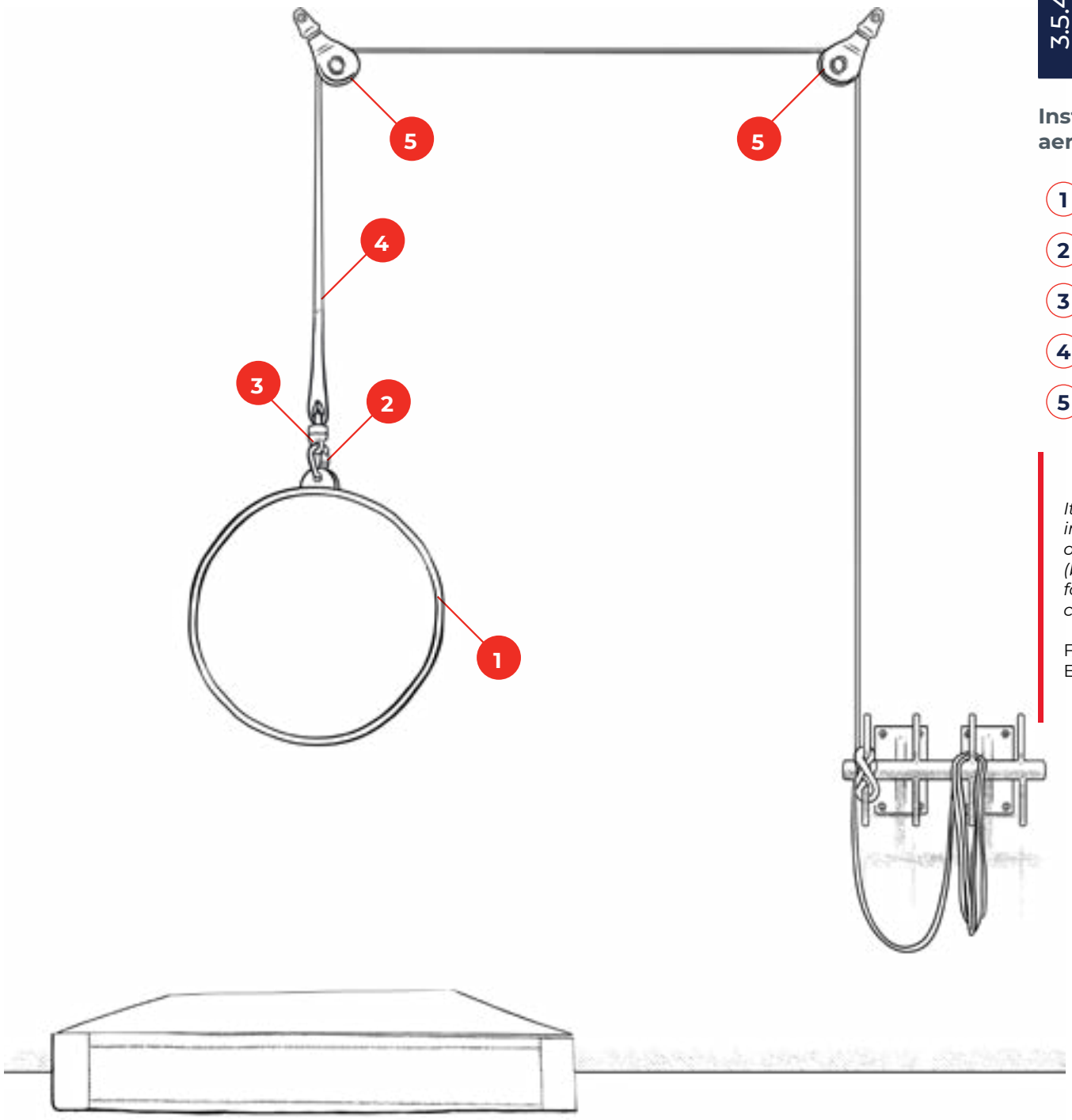
Discipline using a trapeze attached by 2 points, where one or two acrobats perform figures and acrobatics without using the swinging movement. The height of the trapeze is dependent on the number of acrobats and the movements performed. The fixed trapeze used by two acrobats is wider than that used by only one. The catcher hangs on the trapeze in the catching position (head down), enabling the acrobat to perform a variety of acrobatics.

- $ Fixed trapeze: 500$ to 1 000 $ depending on model.
- $ Spreader bar: 100 $ to 500 $
- $ Lunge: from 1 000$ to 2 000 $
- $ Rigging material: 200 $ to 300 $

Swinging trapeze volumetry



These dimensions are based on a 4-meter-long trapeze with large swings and can be used as a reference for the cloud swing.



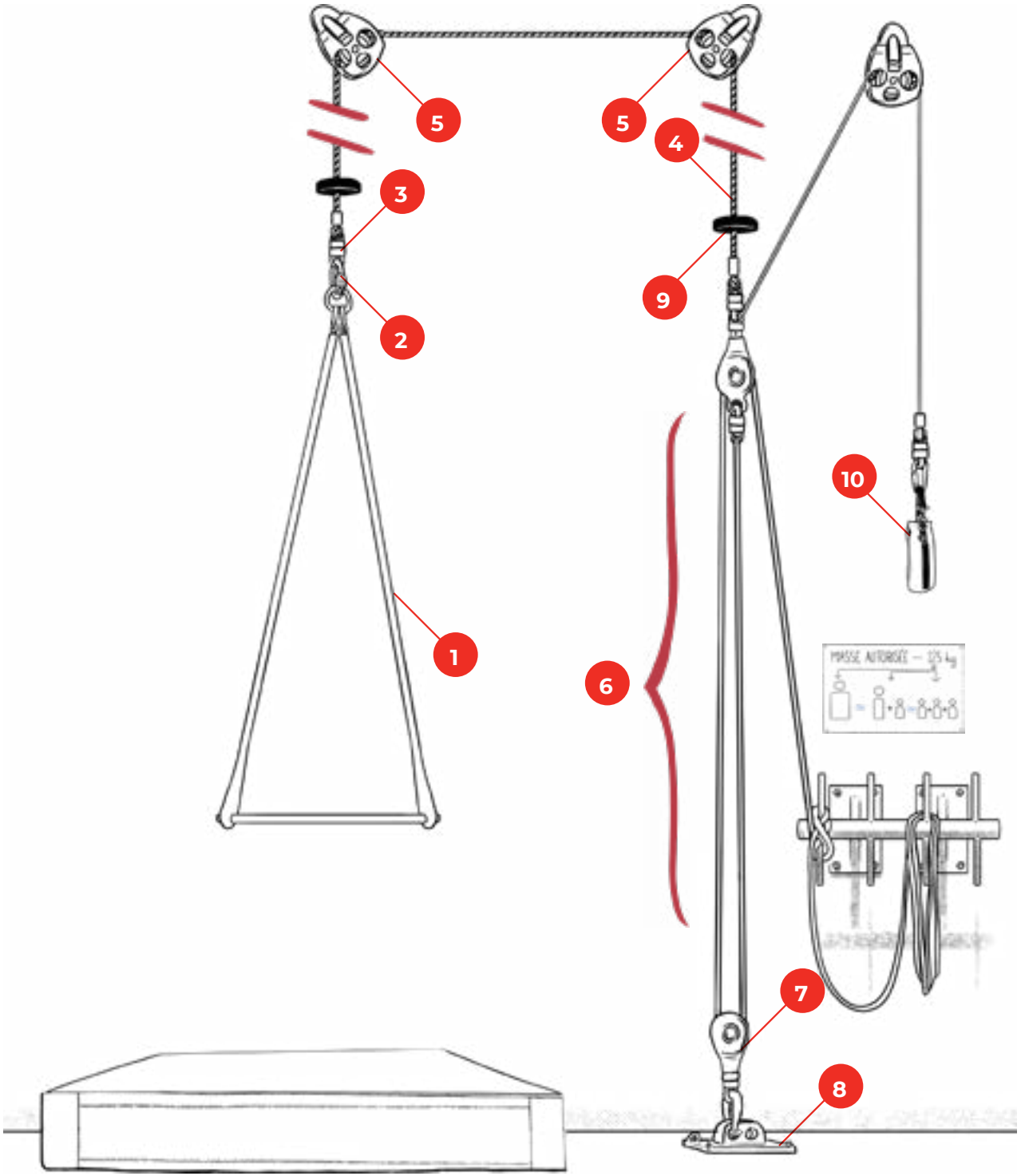
3.5.4 Single point

Installation for rope, hoop, straps, silk, aerial pole, trapeze dance...

1. Apparatus
2. Steel Carabiner triple action
3. Swivel
4. Static rope
5. Pulleys

It is important that all the components of this installation are calculated according to the mass of the users, dynamic factors, installation factors (basket, choke, etc.) and angle factors, without forgetting to add an appropriate use and safety coefficient to the actual loads.

For more information, consult section 3.5.6
Example of a load case for a single point installation.



3.5.5 Single point advantage system

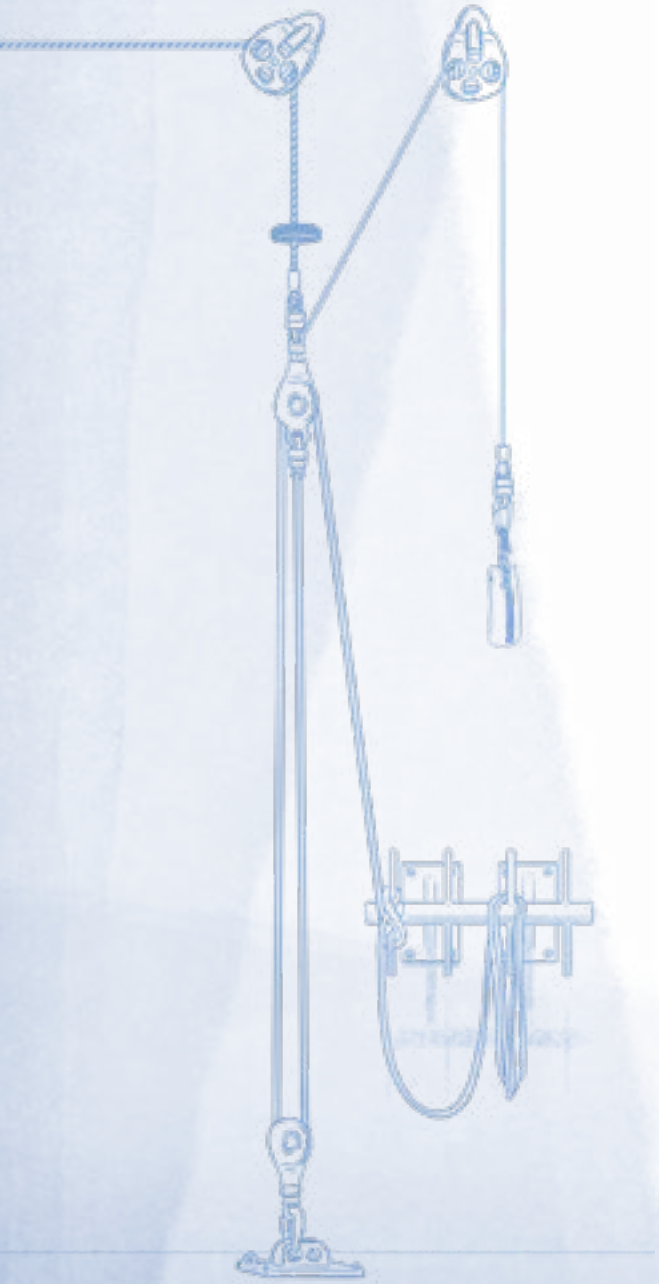
Installation for rope, hoop, straps, silk, aerial pole, trapeze dance

1. Apparatus
2. Steel carabiner triple action
3. Swivel
4. 5 to 6 mm diameter aircraft wire cable or 9 to 11 mm diameter static rope, depending on breaking load. Beware of loss of strength due to knots
5. Pulleys for rope or wire rope. Beware of the increased load due to the working angle of the pulleys.
6. Advantage system (ratio de 3 : 1 illustrated)
7. Connecting element (quick link, carabiner, shackle))
8. Anchor plate
9. Protection: plastic washer, rubber, tennis ball, etc
10. Counterweight (optional)

It is important that all the components of this installation are calculated according to the mass of the users, dynamic factors, installation factors (basket, choke, etc.) and angle factors, without forgetting to add an appropriate use and safety coefficient to the actual loads.

For more information, consult section 3.5.6 Example of a load case for a single point installation.

Example of a load case for a single point system



The values given in the data sheets represent the loads recorded in various Quebec and European circus schools (École nationale de cirque, École de cirque de Québec, Centre national des arts du cirque) and the study carried out in 2021 by Marion Cossin, research engineer at CRITAC/HUPR*. These values are real, measured equipment does not include any safety coefficient.

This type of load case can be applied to several disciplines such as silks, hoops, rope, aerial pole, straps, trapeze dance, etc.

This type of installation can accommodate different levels of acrobatic performance. We recommend adapting this equipment to the situations involving the highest loads.

For recreational, preparatory or academic schools, these high values can be considered as maximums that are rarely reached and therefore constitute a calculation basis for communicating actual loads with the various parties involved, such as organizers, technicians, building managers, engineers, etc.

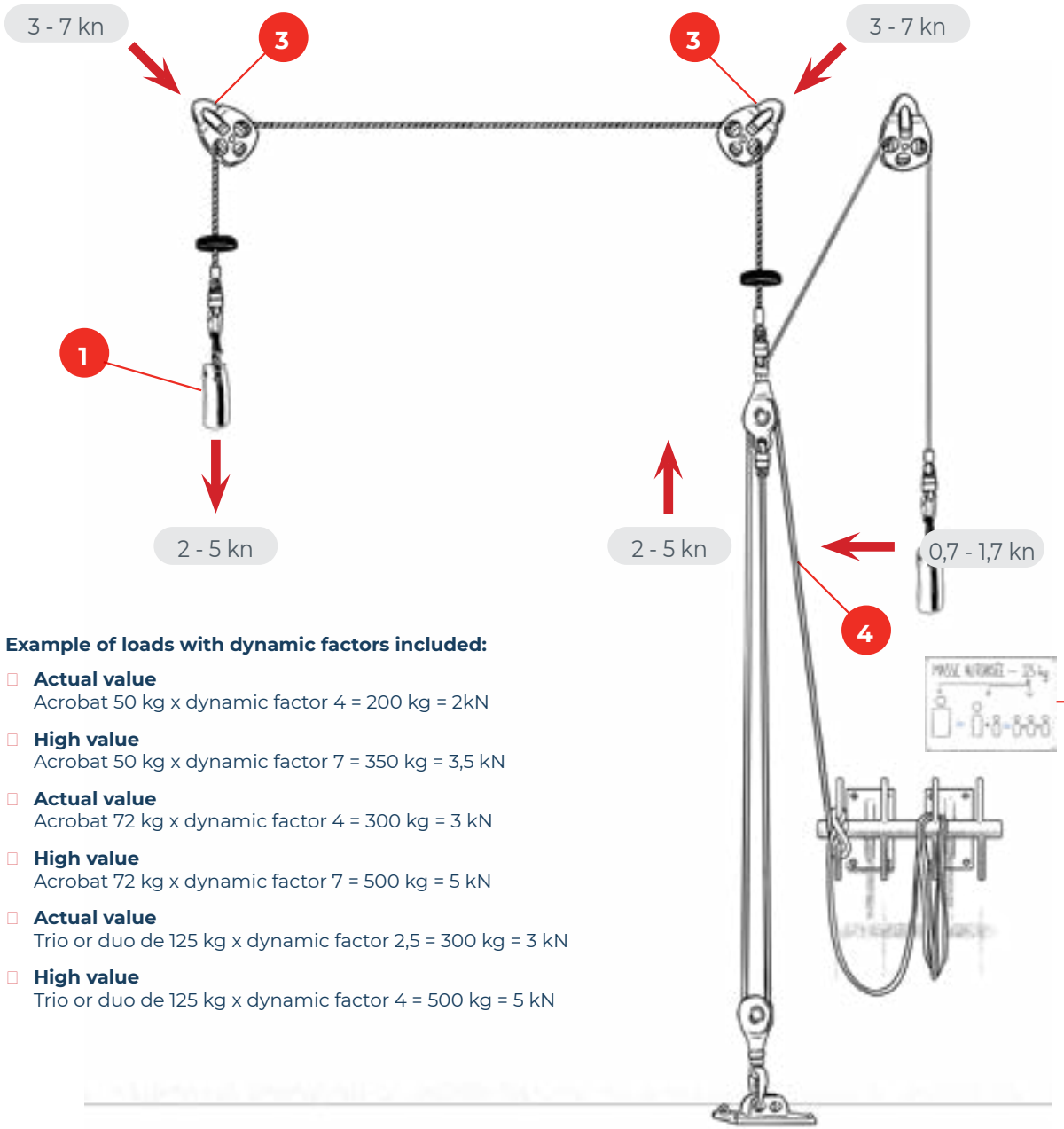
For all equipment, anchors, connectors and components used for overhead installations, it is advisable to choose equipment with a real working capacity (C.M.U Charge Maximale d'Utilisation or W.L.L. Working Load Limit) that corresponds to these values by applying a safety factor.

For equipment, anchors, connectors and all components without a C.M.U. but with a C.R. (Minimum Breaking Strength or MBS), caution must be taken. In fact, the loads announced are generally breaking loads or arbitrary “working capacity” loads. It is therefore out of the question to come close to these values at the risk of creating a situation of danger.

For this equipment, it is important to divide their values by applying an appropriate utilization or safety factor.

Additional note: Equipment, anchors, connectors and all components without a S.W.L, M.B.S, technical data, registration or traceability must not be used under any circumstances.

Example of loads generated by an apparatus on a single point advantage system



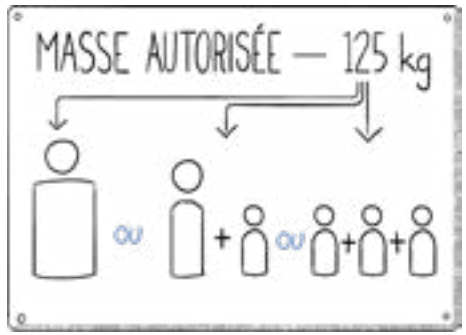
Example of loads with dynamic factors included:

- **Actual value**
  Acrobat 50 kg x dynamic factor 4 = 200 kg = 2kN
- **High value**
  Acrobat 50 kg x dynamic factor 7 = 350 kg = 3,5 kN
- **Actual value**
  Acrobat 72 kg x dynamic factor 4 = 300 kg = 3 kN
- **High value**
  Acrobat 72 kg x dynamic factor 7 = 500 kg = 5 kN
- **Actual value**
  Trio or duo de 125 kg x dynamic factor 2,5 = 300 kg = 3 kN
- **High value**
  Trio or duo de 125 kg x dynamic factor 4 = 500 kg = 5 kN

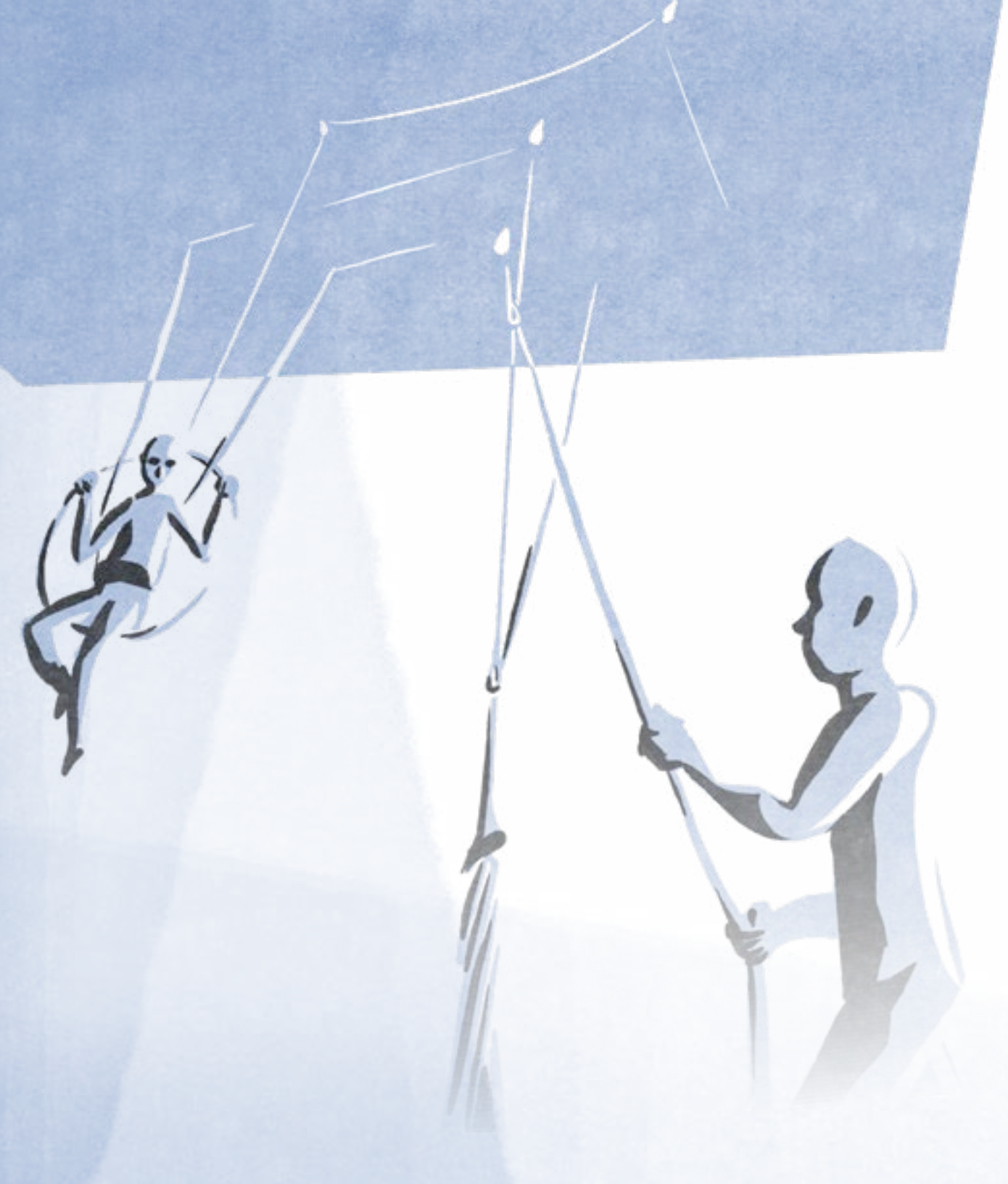
1. Values given are in kN (1 kN equals ± 100 kg).
2. Dynamic factors range from a minimum of 2 for static work, from 3 to 4 for standard acrobatic work, and from 5 to 7 for high level acrobatic performance.
3. This load is increased in the pulleys and their connectors by the angle of installation.
4. This load is divided in the advantage system by the distribution of forces over several rope strands.

For more information

- Étude de Marion Cossin : Making single-point aerial circus disciplines safer



The authorized weight indications on the display panel consider the dynamic factors that will be generated depending on the number of people.



3.6 Lunges

The lunge

The lunge system consists of a belt attached to the acrobat, connected by one or two ropes. These ropes pass through pulleys attached to the roof or structure and are controlled from the ground by a competent person.

The lunge allows safe educational development and gives the acrobat the freedom to explore new movements.

Some aerial or ground acrobatic disciplines use the lunge periodically or occasionally for specific educational exercises (hand-to-hand, icarian, Russian bar, banquine, etc.). On other occasions, lunge is always used (swinging trapeze, clouds swing, acrobatics or balancing at significant heights, etc.).

The lunge does not exclude the use of training mats.

3.6 Lunges

The lunger

«Person responsible for holding the free end of the lunge to which an acrobat is attached in such a way as to be able to cushion the landing or a possible fall at all times» (Office Québécois de la langue française, Culture Montréal. Le Grand Dictionnaire terminologique).

There's no such thing as professional lunger. It is knowledge and skills that come with practice and are passed on from one individual to another. There are different types of lunge techniques, depending on the discipline.

Although there is no specific training, diploma or particular recognition for this technique, the responsibility of lunge operator is not to be taken lightly. It is up to the employer, the human resources manager or the training manager to ensure that the person lunging has the necessary expertise to assume this responsibility.

Competent lunge operators should be qualified by recognized training and certification. This qualification can be obtained by taking an introductory course in the use of circus equipment, for example, as part of the National Circus School's (ENC) initiator, instructor and trainer training programs in circus arts.

The lunger can also manipulate the ascending and descending systems of apparatus such as the hoop, straps, dancing trapeze, etc., rigged to a single point and installed on an advantage system. To find out more, see section 3.5.5 - Aerial acrobatics - Single point on an advantage system.

In conclusion, the circus technician must know how to install a lunge and the teacher must have the expertise to use it.

3.6 Lunges

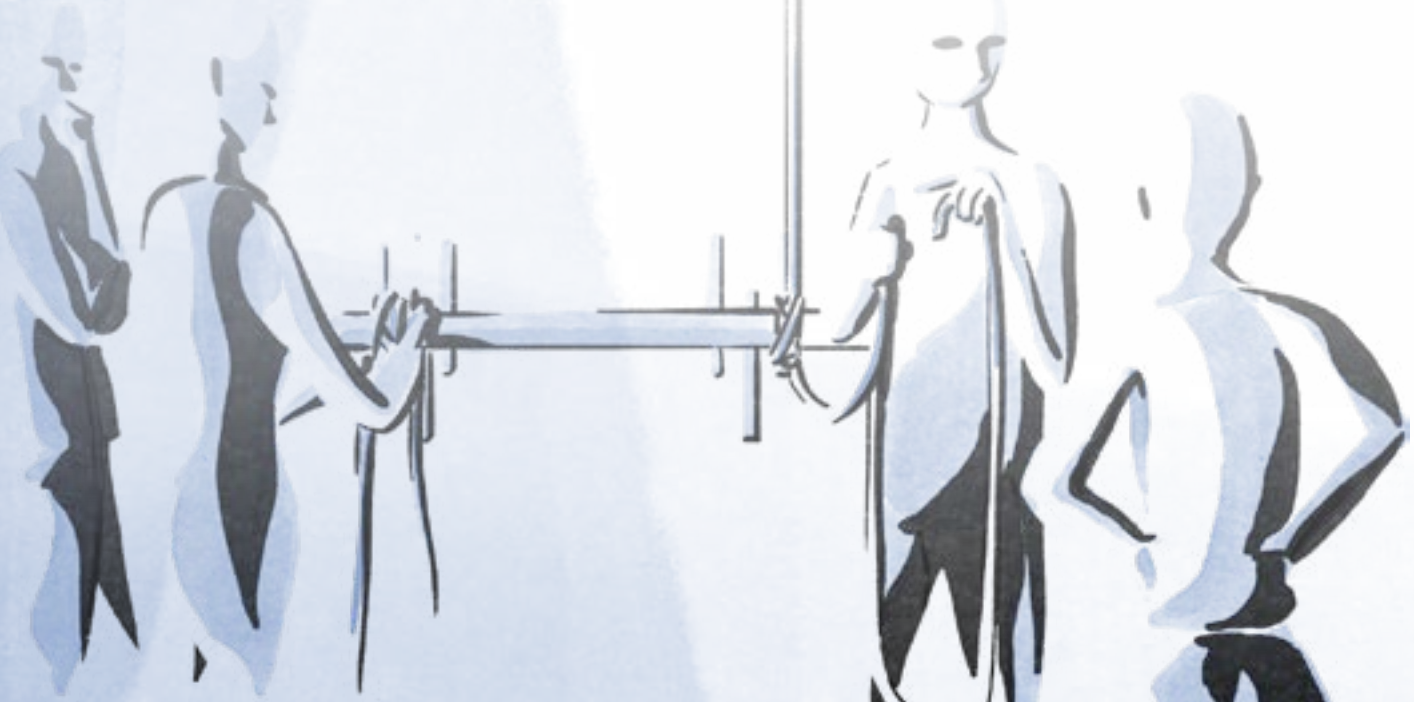
Types of lunges

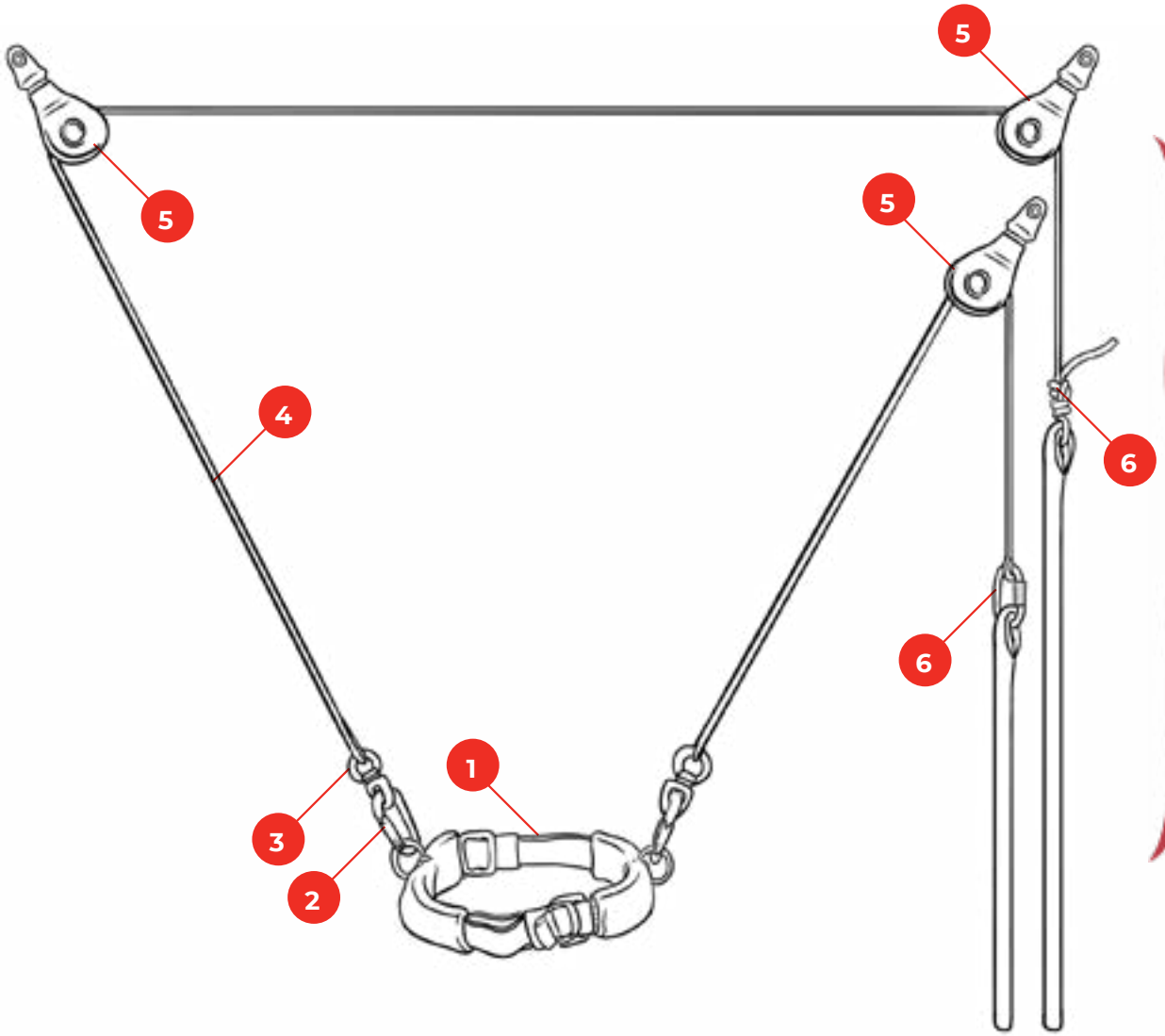
- Single lunge;
- Double lunge utilizing 2 independent ropes (can be used as 2 single lunges);
- Double lunge utilizing 1 rope;
- Double lunge utilizing 1 rope incorporating a travelling pulley;
- Single lunge incorporating a bungee pack (for swinging aerial disciplines; swinging trapeze or cloud swing)

For more information: Lunge 3.6.1 page 85.

Information and advice

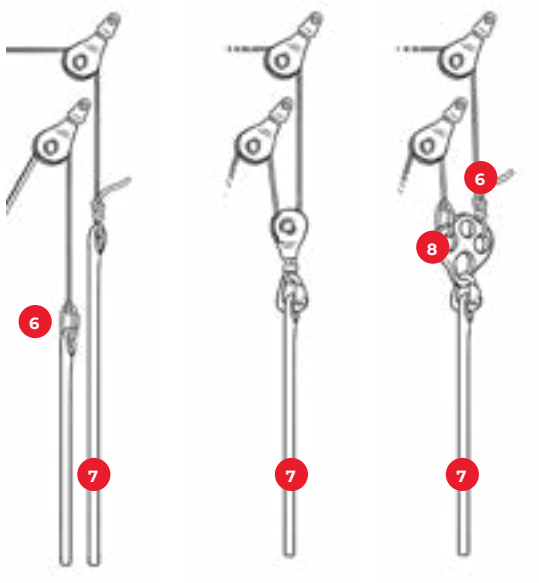
- For aerial disciplines the lunge should be connected to a redundant system attached to the ground. In the event that the lunge is engaged, the acrobat must be held by the rope attached to the ground. It is essential that a system includes a shock absorbing device (bungee pack) between the rope and the ground anchor point to absorb the shock in the event of a fall.
- For aerial disciplines, the lunge must be attached to the ground via a shock-absorbing system consisting of bungee pack including a redundancy which acts as a safety backup in the event of bungee cord malfunction)The lunge system should also include a lowering system at the ground anchor which can be manipulated by the lunger if necessary, in the event of a fall.
- The lunge belt must be adjustable to the size of the participants. It is therefore advisable to have different belt sizes for children, teenagers and adults.
- The complete lunge system (rope, carabiner and belt) should be checked daily or after each use by the instructor. Involving participants in this checking process is a good way of passing on knowledge.
- Lunge ropes must be of the static type, minimal stretch for greater control. The deceleration phenomenon is caused by the physical action of the lunger and the elastic components of the lunge system.
- The price of a lunge system varies according to the type (single, double, self-lunging), the height and size of the installation site, the anchors to be adapted to the ground and the human resources required for installation. Prices range from $500 to $2,000.





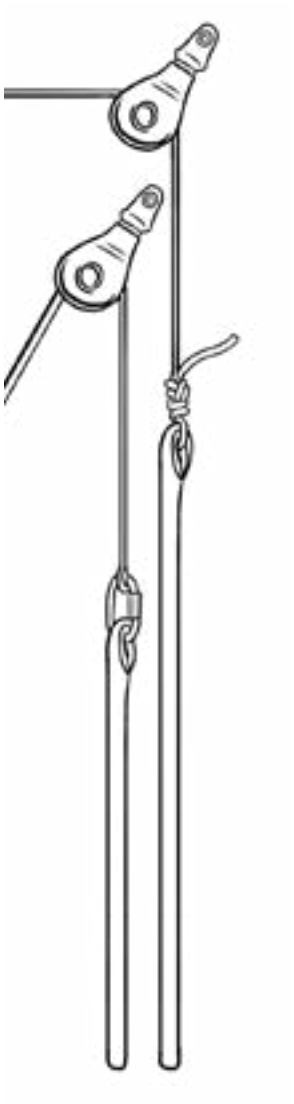
3.6.1 Double lunge

+ **Different versions are detailed on the next page**



1. Adjustable lunge belt
2. Triple action carabiner
3. Swivel
4. Static rope : diameter 8 to 11 mm
5. Pulleys
6. Connection knots (Double figure 8 or triple fisherman) or connector
7. Lunging rope: diameter 15 to 20 mm
8. Rigging plate

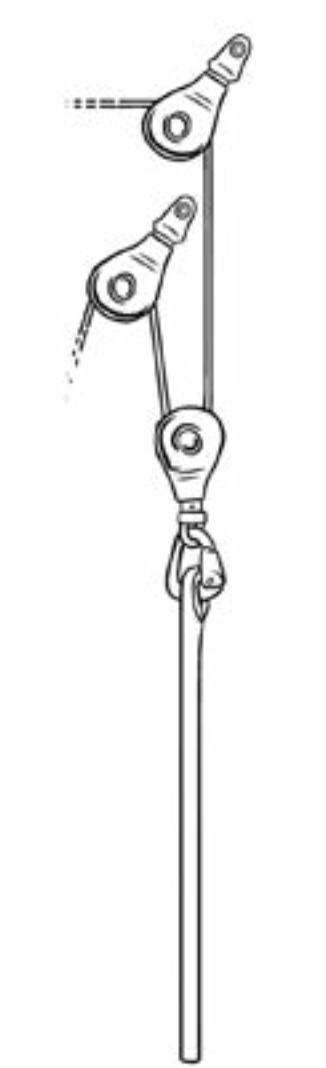
3.6.1.1 **Double lunge** – Different versions



Version A

2 independent ropes

The 2 separate ropes are linked by a knot or a connecting element.



Version B

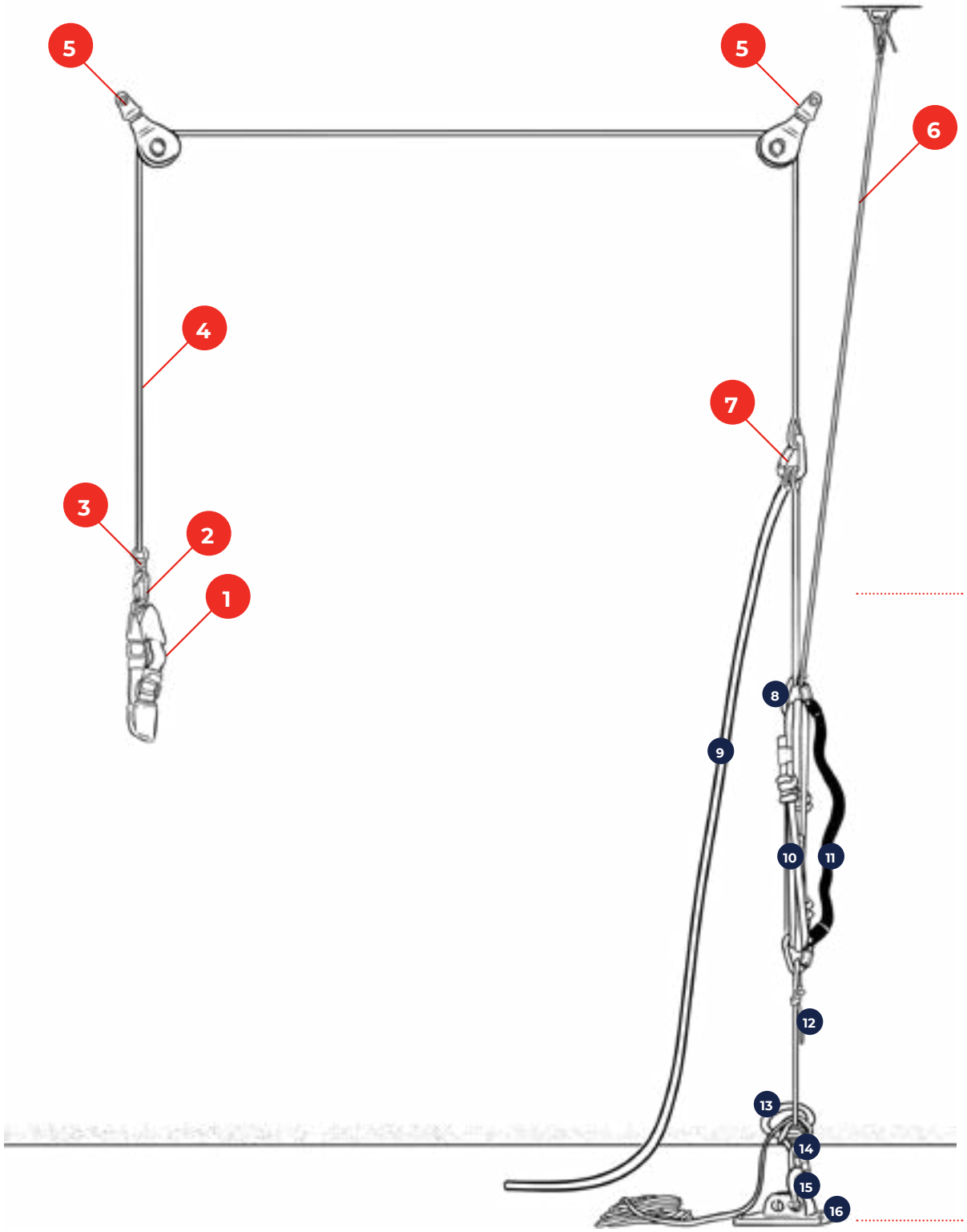
Double lunge utilizing 1 rope

A single rope passing through all the pulleys with the lunging rope attached directly to the travelling pulley.

Version C

2 ropes connected to a rigging plate

The 2 ropes are connected to a junction plate using knots or connecting elements.

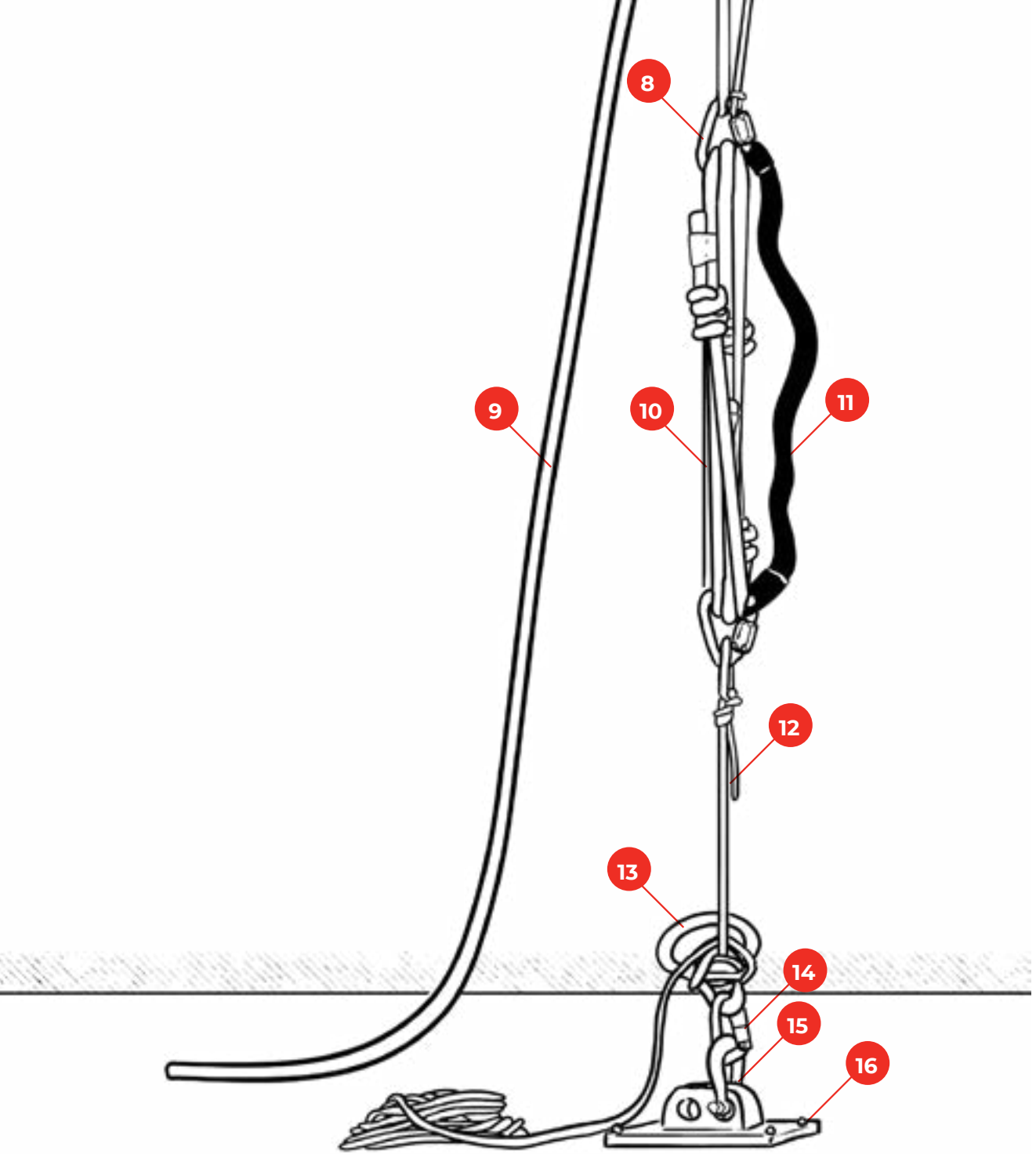


3.6.2 Single lunge with bungee pack

Named "auto-lunge" on a bungee pack system

1. Adjustable lunge belt
2. Triple action carabiner
3. Swivel
4. Static rope: diameter 8 to 11 mm
5. Pulleys
6. Bungee system retaining rope
7. Rope connections (knots, splices, connectors...)

+ **For more details on the bungee pack system, consult the next page.**

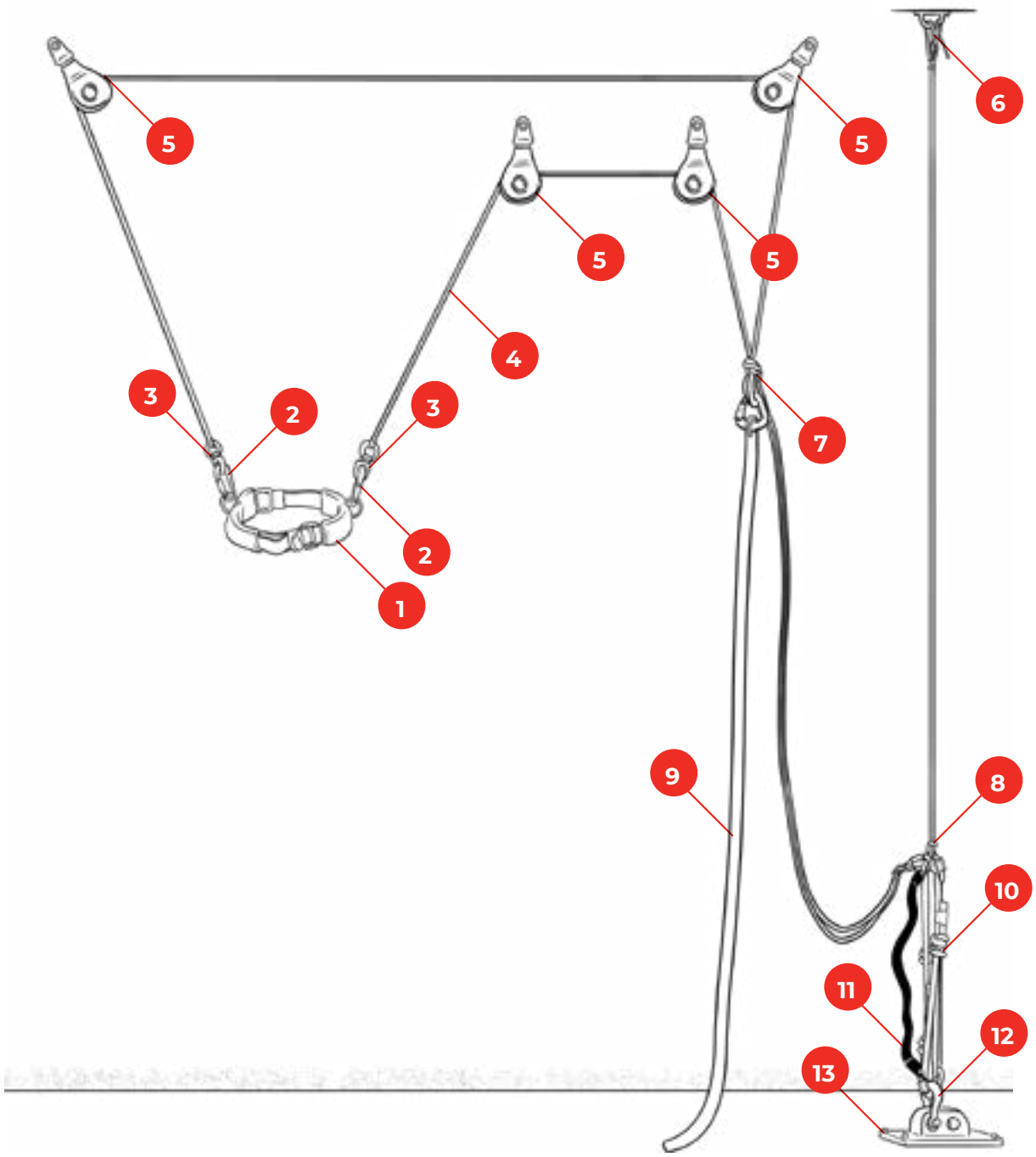


3.6.2.1 **Single lunge with bungee pack** - Details

Named "auto-lunge" on a bungee pack system

8. Quick link or "delta"
9. Lunge rope : diameter 11 to 20 mm
10. "Bungee Pack" or "Shock cord pack"
11. Redundancy sling
12. Lowering system rope: diameter 9 to 11 mm
13. Steel descender
14. Steel triple action carabiner
15. Steel connecter
16. Anchor plate

It is important that all the components of this installation are calculated according to the weight of the users, dynamic factors, installation factors (basket, choke, etc.) and oblique factors (angle), without forgetting to add an appropriate use and safety coefficient to the actual loads. Lunges can be subjected to large dynamic factors; the function of a lunge is to reduce the applied loads during falls.



3.6.3 Double lunge with bungee

1. Adjustable lunge belt
2. Triple action carabiner
3. Swivels
4. Static rope : diameter 8 to 11 mm
5. Pulleys
6. Bungee system retaining rope
7. Connecting knots
8. Quick link (Delta)
9. Lunge rope : diameter 11 to 20 mm
10. "Bungee Pack" or "Shock cord pack"
11. Redundancy sling
12. Steel connector
13. Anchor plate

The bungee pack with a figure 8 lowering system used for a single lunge can also be used in a double lunge system.

3.7 Adapted floors, floor coverings, minimal training mats and training mats

There is a wide variety of adapted floors, floor coverings and training mats. All provide the added protection required for the discipline being taught and the acrobatic level of the participants. Most come from the world of sports, particularly gymnastics. Many references and models are offered by leading manufacturers. This variety underlines the complexity of the appropriate choice. For an introduction to the circus arts, you can refer to the suppliers of sports federations.

Adapted floors & floors covering

Gymnasium-type sports floors, "tatami", dance floors, etc. from 0.5 to 2 cm thick. This type of floor covering is installed to reduce the repetitive impact of acrobatic movements.

Minimal training mats (1 to 10cm)

Coming mainly from the world of gymnastics, minimal training mats are 1 to 10 cm thick and come in a variety of shapes and sizes. They come in a variety of forms: single mats, roll-up mats, puzzle mats, folding or accordion mats, etc. Minimal training Mats are used to absorb specific impacts, such as those caused by rolling, jumping or landing, when the floor or other surfaces no longer meet safety criteria or provide the necessary cushioning.

Training mats (Reception mat) (10 to 60cm)

Also, from the world of gymnastics, training mats or reception mats range in thickness from 10 to 60 cm. They come in a variety of square, rectangular and round shapes, and with different types of foam. Training mats are used for added protection when a participant lands at a greater height, and when a mat no longer meets the safety criteria for the necessary cushioning.

All floor surfaces and training mats must be suitable for the discipline being taught in terms of surface, thickness, foam density and surface materials.Informations et conseils

Information and advice

In this guide, the term "training mats" is used in a school context, but their names and functions in a professional context are different.

Due diligence should be taken when researching and choosing the correct floor covering and training mat. This is an integral part of the overall safety requirements.

When selecting a floor covering or training mat the choice is guided by its intended use and circus disciplines being taught. This choice should be made by the qualified pedagogues implicated in the specific discipline.

When considering acquiring used training mats, it's important to have them thoroughly inspected by a qualified person before use.

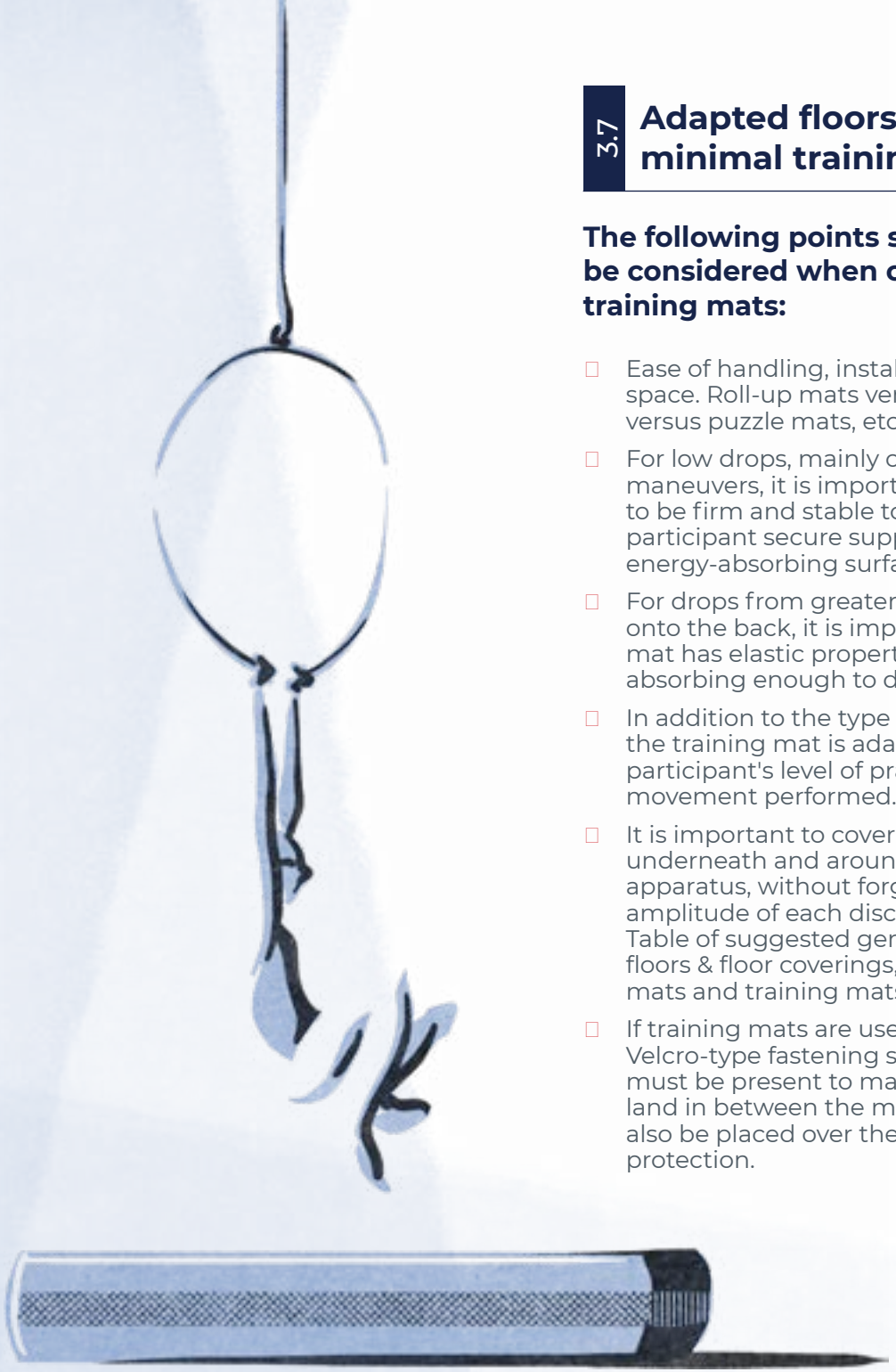
For more information

- Fédération Internationale de Gymnastique - Normes des engins - Edition 2011

3.7 Adapted floors, floor coverings, minimal training mats and training mats

The following points should be considered when choosing training mats :

- Dimensions, depending on the height and scope of the disciplines.
  - Thickness
  - Width
  - Length
- Foam density, depending on the type of impact, height and movement performed.
  - Standing (on feet)
  - Horizontal (on back or front)
  - twisting drop (with twists or pirouettes)
  - Uncontrolled
- Foam density, depending on the training activity.
  - Reception mats or exit mats: training mats used at the exit of the apparatus for landing controlled figures from a certain height. They offer a softer interface than the floor but are nonetheless stable for repeated landings.
  - Educational and throw mats: mats placed under the acrobat when learning certain tricks. They can also be placed on top of another mat to optimize absorption.
- The structural composition of the training mats, depending on the absorption required.
  - Different foam thicknesses
  - Different foam densities (When
  - a training mat has different densities
  - -top and Bottom- use the mat
  - Accordingly)
  - Different assemblies (cubes, French fries, voids)
- Cover types.
  - Fabric or vinyl (quality, weight, color)
  - Velcro or non-velcro, and protections
  - Presence and location of handles
  - Presence of vents or netting for air evacuation
- Storage space
  - When not in use training mats require a dedicated storage space which can be large in Volume. When planning training spaces, the volume of all training mats required should not be underestimated

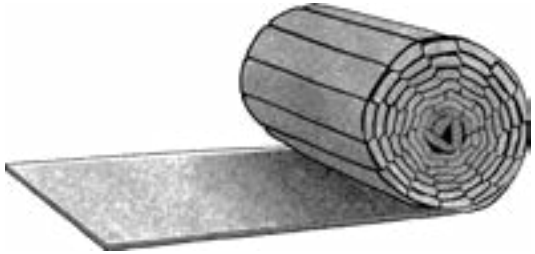


3.7 Adapted floors, floor coverings, minimal training mats and training mats

The following points should be considered when choosing training mats:

- Ease of handling, installation and storage space. Roll-up mats versus accordion mats versus puzzle mats, etc.
- For low drops, mainly on the feet or rolling maneuvers, it is important for the mats to be firm and stable to guarantee the participant secure support and a good energy-absorbing surface.
- For drops from greater heights, mainly onto the back, it is important that the mat has elastic properties and is shock-absorbing enough to decrease the impact.
- In addition to the type of discipline, the training mat is adapted to the participant's level of practice and the movement performed.
- It is important to cover a large safety area underneath and around the acrobatic apparatus, without forgetting the amplitude of each discipline (Ref: 3.7.1 Table of suggested general use of adapted floors & floor coverings, minimal training mats and training mats).
- If training mats are used in conjunction, a Velcro-type fastening system and straps must be present to make it impossible to land in between the mats. A thin mat can also be placed over the junction for added protection.
- Adapted floors, floor coverings, minimal training mats and training mats are regularly cleaned in accordance with the supplier's instructions and sanitary guidelines.
- Adapted floors, floor coverings, minimal training mats and training mats are completely free of obstacles during use.
- Some training mats surfaces (fabric, cordura, etc.) can cause burns when used improperly, such as falls or horizontal slides.
- Training mats should have adequate adherence to the specific floor surface underneath
- The thickness of the mat is sufficiently great to ensure that the participant does not hit the ground on landing (maximum 80% sinkage / gymnastics standards).
- Training mats are regularly inspected and should be changed if they no longer offer the required degree of safety. Foam loses volume over time: this is known as mattress memory. At a sinking level of 80% or more, it is important to reshape mattresses or change the foam and repair the cover if possible.
- Also, in disciplines where a lunge is used, it is recommended to provide a landing area protected with adapted floors, floor coverings, minimal training mats and or training mats
- The considerable cost of these items must be factored into the budget. Prices range from $50 for small mats to $4,000 and more for training mats and reception mats, depending on size.

Overview of adapted floors, floor coverings, minimal training mats and training mats



Flexi-roll, accordion mat, puzzle mat - 10 to 25 mm

Disciplines : Floor acrobatics, juggling, contortion, etc. Extra protection for disciplines requiring a large surface area.

- Easy to place and move.
- When using multiple together they should be attached using Velcro.
- Require adequate dedicated storage space.

Dance floor - 0,5 to 8,5 mm

Disciplines : Dance, floor acrobatics warm-up, bicycle, unicycle, Cyr and German wheel, stilts, hand-stand, contortion, juggling, etc.

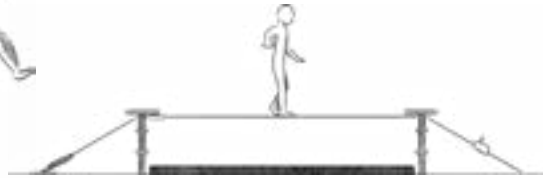
- Warning: no more than 5 mm thick for rolling disciplines such as acrobatic bicycle, unicycle, Cyr wheel, German wheel, etc.
- Storage advice: it's recommended to roll preferably around a cylinder (cardboard, plastic, etc.).

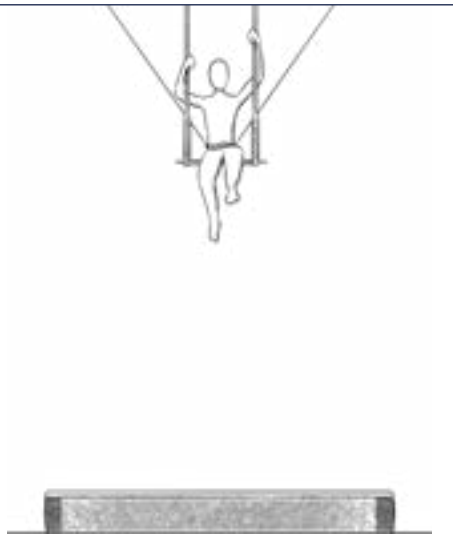
Adapted floor or sports or multisport use - 3 to 10 mm

Disciplines : Dance, floor acrobatics warm-up, bicycle, unicycle, Cyr and German wheel, stilts, hand-stand, contortion, juggling, etc.

- Warning: no more than 5 mm thick for rolling disciplines such as acrobatic bicycle, unicycle, Cyr wheel, German wheel, etc.

Examples of use





5 cm

Disciplines

Floor acrobatics, tight wire, educational, etc. Extra protection for lunged disciplines.

Minimum thickness for controlled receptions below 50 cm in height.

$ ± 200 $
for 120 cm x 200 cm x 5 cm

± 10 cm

Disciplines

Tight wire, introduction to teeter board, Chinese pole, etc. Extra protection for lunged disciplines.

Minimum thickness for controlled receptions below 100 cm in height.

$ ± 600 $ for
120 cm x 240 cm x 10 cm

15 to 20 cm

Disciplines

Aerial (Rope, tissue, etc.), Tight wire, introduction to teeter board, Chinese pole, etc. Extra protection for lunged disciplines.

Minimum thickness for controlled receptions below 200 cm in height.

$ ± 1000 $ for
160 cm x 300 cm x 25 cm

30 to 40 cm +

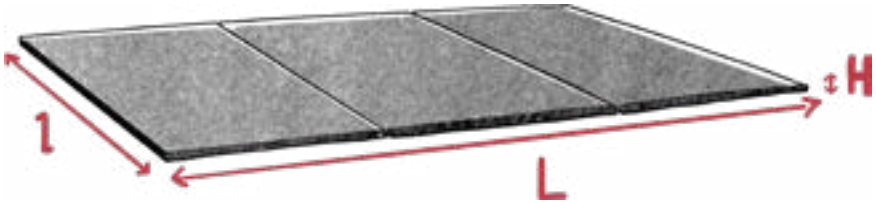
Disciplines

Russian cradle, fixed trapeze, aerial act, teeter board reception. Extra protection for lunged disciplines.

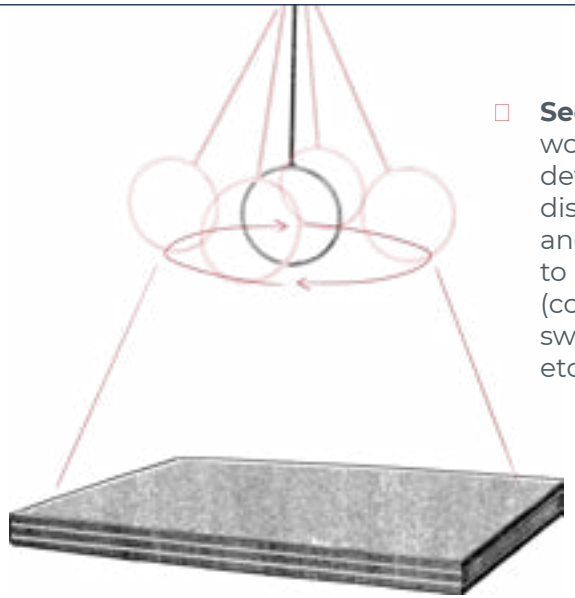
Minimum thickness for controlled receptions below 300 cm in height.

$ ± 2000$ for
180 cm x300 cm x 50 cm

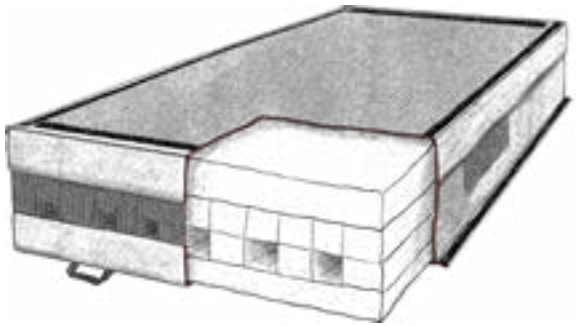
Usage criteria



- **Thickness :** To determine the thickness of a mattress, a ratio of 10% to 15% of the working height is recommended. As a reference, the Fédération Internationale de Gymnastique (FIG) recommend ±15%.
- **Length :** The length is determined by the total movement of the acrobat, with or without apparatus.
- **Width :** The width is determined by the height of the apparatus. et l'amplitude des figures enseignées.



- **Security zone :** A conical working area should be determined for aerial disciplines, according to angle of displacement due to acrobatic movements (controlled or uncontrolled swinging, body movements etc.).



- **Surface area :** To determine the surface area of the mat, the following parameters must be considered: maximum working height, displacement, swinging or circular work of the acrobat and the apparatus.
- **Foam types :** To determine the type of foam and its assembly, you need to consider the type of fall (feet, back, controlled or uncontrolled, etc.).

- **Caution !** A sufficient surface area directly beneath the apparatus should be anticipated. There is always an angle of displacement due to acrobatic movements (controlled or uncontrolled swinging, body movements etc.).

3.8 Complementary disciplines

Several disciplines that are not specifically circus-related are included in the programs of the various schools and practice facilities. These are referred to as complementary disciplines.

These disciplines are all too often overlooked in the design of projects, in terms of space, equipment and therefore budget.

Information & advice

For dance and music studios:

- It should be considered the possible significant sound levels produced by these disciplines (music, sound systems, voices, loud impacts, etc.).
- Floors are adapted to practice: sprung floor, dance floor, etc.
- Movable stable dance bars, or dance bars firmly fixed to walls, should be considered.
- Mobile stable mirrors or mirrors fixed to the walls should be considered. A system of curtains on tracks should be provided to avoid annoying reflections or impact during use for certain other disciplines.
- Storage space is provided in the adjoining rooms for accessories and equipment (musical instruments, lecterns, accessories, etc.).

For acting and clowning studios:

- We need to consider the sometimes very high noise levels produced by these disciplines (sounds, shouts, impacts, music, etc.).
- Storage space is provided in the adjoining rooms and is dedicated to accessories and equipment (costumes, accessories, etc.).

For magic disciplines and theory courses:

- These disciplines need a quiet environment.
- Theoretical courses require specific furniture:
  - Tables and chairs;
  - Desks and workstations;
  - Projector and screen;
  - With board, etc..
- Storage is provided in the annex rooms and is dedicated to accessories and equipment (teaching materials, accessories.).

3.9 Disciplines not included

This guideline does not detail certain disciplines for the following reasons.

- Risk analysis and management are complex and specific;
- Too much space required;
- The complexity of the installation;
- The cost of equipment;
- Highly specialized teaching;
- A large group often needs to be implicated.

As a result, these disciplines are difficult to include into a project aimed at the leisure, school and preparatory circus arts sector in Quebec.

Examples of out-of-context disciplines (this list is not exhaustive):

- Equestrian arts;
- Russian swing;
- Chair balancing;
- High wire or high line;
- Wheel of death;
- Aerial perch;
- Flying trapeze and its variants;
- Washington trapeze.

4 - Installation, de-installation and maintenance.

4.1 Introduction

The assembly and disassembly, use and maintenance of acrobatic equipment are all part of an interrelated whole with each individual element combining to create the complete picture.

Here we briefly describe each step and then develop them further.

The essential steps:

Installation and de-installation

Action that determines the installation or de-installation of a ground or aerial apparatus, structure or acrobatic equipment (apparatus, cradle, swinging bar, lunge, etc.).

Installation validation

This is the action of confirming the correct assembly and operation of each new installation before it is used.

Inspection

These are actions taken on a regular basis to validate or confirm the proper operation and mechanical integrity of installations and fixtures. These checks are carried out by a competent person.

Maintenance

Troubleshooting, repairing, adjusting or replacing certain elements of acrobatic equipment or materials that have been reported as faulty, ill-fitting, out of date or in doubt.

Mandatory controls

These are actions taken on a regular basis (half-yearly, annual, biennial, or according to the manufacturers' recommendations) to check certain installations. These checks must be carried out by qualified internal or external personnel.

- Inspection book, log or register,
- This dossier is expected to bring together:
- Purchase invoices and
- manufactures info sheet
- Notes made after each installation;
- Inspection or verification sheets;
- The maintenance provided;
- Documentation of mandatory controls.

For more information

Appendix 4 - Template documents (cont.)

4.2 Montage et validations

Legal side (Applicable in Quebec)

All installation and de-installation work must comply with labor and building regulations:

- The Law on Labor Standards establishes the minimum working conditions that apply in Quebec. In particular, it deals with wages, leaves and absences, notice of termination of employment and recourse by an employee to the CNESST (Commission des normes, de l'équité, de la santé et de la sécurité du travail).
- The Building Act brings together, within a single legislative framework, all the laws, regulations and standards governing the development of premises under the responsibility of the RBQ (Régie du bâtiment du Québec).

Information & advice

- For all initial installations, a circus technician or other competent personnel should consulted. Following these installations, a transfer of knowledge of the instillation, deinstallation and maintenance protocol takes place between the circus technician and the teacher. Eventually all relevant participants in these operations should be implicated to raise their awareness and establish good safety habits.
- Prepare an installation procedure and verify that it is followed during set-up.
- Plan tasks based on risk analysis (preparation on the ground, minimizing movements at height, etc.).
- Check the Working Load Limit (WLL or CmU) of each component used.
- Prepare all necessary materials before starting assembly.

For more information

- CNESST : Commission des normes de l'équité de la santé et de la sécurité du travail
- RBQ : Régie du bâtiment du Québec

4.2 Installation and validation

Inspection

Inspections consist of a careful examination of the integrity of equipment, installations and their parts (apparatus, mats, personal protective equipment, lanyards, connectors, etc.) and their proper operation. Inspections are carried out by competent persons to validate the proper operation of the installations and to correct any irregularities that could affect the safety of the equipment and participants. Carried out periodically by a competent circus technician.

Legal side

It is the responsibility of the owner, operator or technical manager to ensure that all equipment and facilities are safe for use. In addition, he/she must organize inspections, checks and controls of the building and related installations.

Information & advice

Inspections are carried out to:

- Ensure that equipment is in good working order;
- Locate, identify and eliminate risks;
- Monitor wear and tear on equipment and schedule its replacement or removal;
- Budget and plan equipment replacement and purchases;
- Implement preventive measures to counter the risk of accidents caused by broken or malfunctioning technical equipment.

4.2 Installation and validation

Type and frequency of interventions

Validations of installation

Validations are carried out for each new installation by a competent person, a teacher or a circus technician, and consist of:

- An examination of all installation components (ropes, cables, slings, hardware, connectors, etc.);
- Verification of anchor points and rigging points;
- Verification of the apparatuses, lunge ropes and their supports.
- Validation of correct operation of assemblies (friction, noise, conflicts, etc.);
- Validation of equipment adjustments (final adjustment, symmetry, leveling, regularity, etc.);
- Once the final installation has been made then tested and validated by all parties; semi-permanent marks can be made on the equipment the ensure the continued correct and safe installation in the future.
- Authorization of safe usage to the teacher.

Regular inspections

Performed by the teacher before each use, inspections consist of:

- Visual inspection of the entire installation; ground based and or aerial
- A visual and physical check of the lunge belt (buckles, locking mechanism, textile wear etc.);
- A check of general operation (friction, noise, equipment wear, etc.);
- A check of the ground based equipment;
- Immediately report any unusual, suspicious or questionable details to the technical manager.

Regular Scheduled inspections

Carried out by a qualified circus technician, inspection frequency varies from weekly to annually. Frequency is determined by taking into account:

- Frequency and intensity of use of facilities, equipment and lunges;
- Manufacturer's recommendations;
- The availability of premises with a schedule dedicated to inspections (secure area, clear floor, noise level suitable for communication, etc.).

Maintenance

Maintenance is carried out on demand or planned, taking into account:

- Comments made by teachers or participants on the state of equipment and facilities;
- Premature wear or damage to certain components;
- Suspicious noises (rubbing, banging, etc.);
- Manufacturer’s recommendations

Although there's no legal obligation to do so, we recommend that you carry out a complete inspection of your apparatus, lunge, installations and acrobatic equipment at least once a year.

However, there are some acrobatic fixtures that are considered consumable or perishable, made of synthetic or natural materials such as fabrics, bungee cords, ropes and so on. In general, these items should be inspected much more frequently. In addition to the usual in-use inspection, a visual and tactile inspection is recommended on a weekly to monthly basis, depending on the frequency and intensity of use.

Control

A control consists of a careful examination of the integrity and proper operation of specific installations such as motors, personal protective equipment (harnesses, lanyards, lifeline, etc.) or collective protective equipment (walkways, ladders, motorized access equipment etc.). These checks must be carried out by approved companies or qualified personnel.

Legal Side

It is the responsibility of the owner, operator or technical manager to ensure that all equipment and facilities are safe to use. In addition, he/she must organize inspections of the building and its installations. His responsibility includes the following.

- Personal protective equipment (PPE) used when working at height must be inspected. Safety work harnesses and all related accessories must undergo an annual inspection by a qualified person.
- Lifting equipment such as winches, hoists, Tirfors and certain lifting accessories must be inspected regularly. Inspections should be carried out every six months, every year or every two years, etc.

Inspection and maintenance log-book

To keep track of equipment, installations and their validations, inspections or checks, maintenance and controls, it is advisable (and compulsory for controls) to keep an up-to-date inspection and maintenance register.

This maintenance logbook has no defined content and must be adapted to the size of the organization. It can be arranged in different ways. In its simplest form, it should include:

- Date and plan of installation;
- List of equipment used and installed;
- Date of purchase and expiration date for perishable equipment;
- Date and name of person responsible for assembly validation;
- Inspection frequency;
- Date of inspection and name of person responsible;
- Corrective action taken for each maintenance item;
- Inspection observation notes.

Examples of documents available in Appendix 4 - Model documents types.

Legally with a view to traceability, this inspection and maintenance register must include :

- Copies of purchase invoices
- Manufacturer's instructions.
- Assembly and disassembly instructions;
- Operating manuals;
- Inspection procedures;
- Inspection and maintenance sheets;
- Certifications;
- Reports on mandatory inspections carried out.

A communication protocol should be put in place to improve the flow of good information between the various technical staff and teachers on the state of acrobatic equipment, apparatus and their proper functioning, for example: a logbook, bulletin board, blog, etc.

For more information

- CNN/SCC : CAN/CSA-Z259.10 Conseil canadien des normes
- CSA : CSA Z259.10:F18 - Association canadienne de normalisation

4.3 Working at height

Legal Side

The primary objective of Quebec's Act respecting occupational health and safety is to prevent work accidents. Among the occupations working at height is included. There are specific Quebec safety standards governing working at height conditions.

The specific aspects of working at heights set out in the regulations derive from the Quebec Act respecting occupational health and safety and the Safety Code for the Construction Industry.

Employers are responsible for the health and safety of their workers.

For personnel required to work at height, training in working at height and fall protection is compulsory and must be renewed regularly.

Employers and workers involved in working at heights must comply with Quebec's Regulation respecting occupational health and safety, which governs working at heights

Information & advice

- For safety reasons, working at height is never done alone. A minimum of 2 people is required at all times.
- Overhead moving equipment must be checked before each use.
- Ground assembly and preparation are preferable to overhead operations.
- Work at height is carefully planned and includes a specific emergency response plan with a height rescue plan.
- Hazards and risks are assessed before work is carried out at height.
- Appropriate training, information and signage are put in place to ensure that workers are aware of the need to protect themselves.
- Attention should be paid to the latest regulations and techniques.

For more information

- Légis Québec : Code de sécurité pour les travaux de construction
- CNESST : Lois et règlements CNESST
- CNESST : Fiche tolérance zéro - CNESST

4.4 Eco-design, eco-responsibility and sustainable development

In Quebec, sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their needs.

Sustainable development is therefore based on a long-term vision that considers the inseparable nature of the environmental, social and economic dimensions of development activities.

Environmental issues are now systematically integrated into all approaches to circus arts practices.

For more information

- Loi sur le développement durable
- Code national de l'énergie pour les bâtiments

Information & advices

- Environmental standards are integrated from the earliest thoughts of venue design.
- Facilities, equipment and material are designed or purchased with the respect for the environment.
- Waste is managed in an environmentally friendly way, with selective sorting and the installation of sorting points is adapted.
- Sustainable development is taken into account in the organization of major events.
- The use of eco-responsible means of transport such as public transport or bicycles is promoted.
- The purchase of products manufactured according to sustainable development principles is favored (organic cleaning products, recycled, recyclable or biodegradable materials, etc.).
- The purchase of non-disposable consumer goods is preferred.
- Obsolete or outdated acrobatic equipment and materials are destroyed and recycled to the best of their ability.
- Energy consumption is controlled.
- The environmental cost of using the site is assessed.
- A module on sustainable development should be included in training courses for teachers, technicians and professional artists.

4.5 Purchasing, suppliers and fabrication

Caution

While the manufacturing standards of certain sports federations can be used as a basis for certain equipment (mats, equipment, etc.), there is nothing specific for apparatus or circus equipment.

Particular attention needs to be paid to the choice of acrobatic equipment and apparatus.

While juggling equipment is commonplace, the same cannot be said for aerial or ground acrobatics. It's important not to confuse

acrobatic apparatus from different sports federations and so-called leisure or entertainment apparatus for the general public.

If the term “circus leisure” is applied to equipment, the use of this specific equipment, especially aerial equipment, manufactured to so-called leisure standards, should not be considered acceptable for use.

Suppliers

Equipment for beginners

Basic equipment for teaching aerial disciplines can be obtained from specialized circus equipment suppliers. The equipment available from these suppliers may be sufficient for introductory courses for participants aged 6 to 12. For more information, see chapter 1.6 - Budgeting and purchasing equipment.

Equipment for preparatory and semi-professional level

In a school where more intensive training courses are being set up, it is advisable to purchase equipment with specific characteristics that optimize its use in a context of sustained and intensive practice. For example, if participants aged 8 to 16 regularly use a trapeze or aerial hoop, and the dynamic loads are increasingly intense, then professional (or “custom”) equipment should be preferred. This more specific equipment can still be used for other classes whose participants have a less advanced acrobatic level. This equipment can be obtained by contacting specialized equipment designers. For further information, please refer to chapter 1.6 - Budgeting and purchasing equipment.

It is therefore important to know the acrobatic level, and to consider the intensity of use versus the specific features of the product, in order to check that the use made of it is in keeping with its capacities.

Acrobatic equipment characteristics to consider when purchasing:

- Resistance to the impact of acrobatic dynamic factors;
- Durability;
- Ergonomics;
- Quality of materials;
- Traceability.

The advantages of buying equipment from a trusted specialist supplier are:

- The equipment is adapted to the requirements of circus apparatus;
- Traceability;
- Instructions for use, care or maintenance;
- Manufacturing certifications;
- Comes with insurance guarantees, if applicable;
- After-sales service.

Note that Quebec's Act respecting occupational health and safety requires suppliers to ensure the safety of their products.

4.5 Purchasing, suppliers and fabrication

"In-house fabrication"

In-house fabrication is the process of making one's own equipment to various degrees.

While' in-house' fabrication of juggling equipment or simple apparatus such as the Rola-bola, wooden wedges for balancing, etc. is feasible in-house, it is more complicated for complex acrobatic equipment (tight wire, Russian cradle, aerial hoop, trapeze, etc.).

In-house fabrication of complex equipment is possible under certain strict conditions because:

Aerial apparatus fabricated in- house must be considered as lifting equipment therefore must be traceable in terms of:

- Their Working Loal Limit (W.L.L) / charge maximale d'utilisation (C.m.U), or a Breaking Load (B.L) / Charge de Rupture (C.R) or a calculation note written by an engineer;
- Manufacturer's name;
- Country of manufacture;
- A reference code number;
- Recommended maximum end of use date if the equipment includes synthetic materials;
- A weld inspection or weld certification, if applicable;
- The origin of structural materials. For example, a mill test report ensures traceability and quality assurance of the steel used and the process used to produce it.

In an increasingly standardized environment, it is difficult and very complicated to track and obtain traceability information. We therefore strongly advise against self-production. We therefore advise you to call on the services of a competent circus technician who is responsible for the entire acrobatic equipment manufacturing project.

4.6 Empowerment, awareness and involvement.

Knowledge transfer between circus technicians and teachers, and between teachers and participants, should be part of the daily routine of a circus school. It's one way of raising awareness and ensuring that important technical information is passed on. Teachers and participants are encouraged to develop a culture of safety around acrobatic equipment.

Caution: this is not a pretext for ignoring the importance of using competent personnel, i.e. circus technicians and teachers who have received the necessary training and possess the necessary skills or qualifications concerning the use of acrobatic equipment and the practice of circus arts.

Information & advice

Recommendation:

- Raise awareness by involving participants and teachers in the verification, preparation, assembly and dismantling of installations and equipment used during their classes;
- Set up training courses for personnel required to handle acrobatic equipment;
- Produce and install signage in practice areas providing information on equipment use and safety.

4.7 Health & safety and documentation

Roles and responsibilities

The CNESST requires a ratio of First Responders which is inadequate in a circus arts teaching context.

We therefore recommend that there is always a First Responder with up to date first-aid training present.

A “first-responder” is defined as the holder of a valid first-aid certificate issued by a recognized organization, and whose work in no way compromises his or her ability to intervene quickly and effectively.

Two levels of training are available: first aid (approximately 8 hours) or general first aid (approximately 16 hours).

We recommend that you establish an emergency protocol for minor and major accidents (procedures, designated responders, accompaniment to hospital, etc.) and make it known to staff and participants.

Extract from CNESST:

- Ensure at all times the presence of the minimum number of first-responder attendants prescribed by regulation;
- Ensure that first-responders' training is kept up to date;
- Display the names of first responders in a visible place;
- Depending on the number of first responders required, designate workers to be first responders, ensuring that the nature of their work does not compromise the speed and effectiveness of the response;
- Recognize that first responders are considered to be at work and pay them during their training and whenever they are required to intervene as first responders during their working hours;
- The first responder is responsible for completing the accident, incident and first aid register..

For more information

- Formation de secourisme en milieu de travail, CNESST

4.7 Health & safety and documentation

Training, first aid and rescue

Regulations on minimum standards of first aid and first aid treatment are defined by the Ministère du travail, de l'Emploi et de la Solidarité social and the Commission des normes de l'équité de la santé et de la sécurité du travail (CNESST).

For first aid kits:

- The employer must provide his establishment with an adequate number of first-aid kits that are easily accessible, as close as possible to the workplace and available at all times;
- Provide the workplace with a sufficient number of first-aid kits meeting the standards;
- Ensure periodic verification of the contents of these kits, maintain an inventory and provide for replenishment.

For more information

- A-3.001, r. 10 - Règlement sur les normes minimales de premiers secours et de premiers soins

Documentation and Signage

For each location, we need to examine the various possible risks and establish the ideal response for each type of situation.

The following measures must be put in place:

- Display the evacuation plan for each area of the facility and emergency telephone numbers;
- Identify the location of first aid kits;
- Develop an emergency response plan that will:
  - Identify the staff members responsible, the action they must take and their contact details, according to current schedules;
  - Establish an evacuation plan and an assembly area outside the facility;
  - Determine the actions to be taken by the various staff members designated as responsible in the event of an emergency (alarm system activation, declared fire, power failure, intrusion, accident, accident at height, etc.);
- Each school session, update documents and hold a training or reminder meeting aimed at staff and participants;
- Participant files at the activity location, with parents' contact details (for minors), must be accessible to responsible staff;
- Have access to means of communication enabling emergency services to be alerted quickly, such as a landline telephone or walkie-talkies;
- Organize regular evacuation drills noted in the safety register;
- Complete and sign an accident report, even in the event of a minor accident, with a view to medical follow-up in the event of recurrence, history or worsening of injuries.

For more information

- CCHST : La planification des interventions d'urgence
- CSN Info : Qu'est-ce qu'un plan de mesures d'urgence (PMU)
- Gouvernment de Nouvelle Écosse : Guide de gestion des urgences offert aux écoles

5 - Appendices

Appendix 1 – Regulations of government agencies

A selection of websites on federal, provincial and municipal government regulations.

Human resources

Regulations governing human resources, employment standards, workplace safety, equity and human rights:

- Canada.ca : Règlementation en matière de ressources humaines
- CNESST : Commission des normes, de l'équité, de la santé et de la sécurité du travail
- CDPDJ : Charte des droits et libertés de la personne
- CHRSC : Le Conseil des ressources humaines du secteur culturel (CRHSC)
- Compétence Culture : Le Conseil québécois des ressources humaines en culture

Construction code

- RBQ : Régie du bâtiment du Québec
- Légis Québec : Code de sécurité pour les travaux de construction

Fire prevention and safety

- CNPI : Code national de prévention des incendies

Pyrotechnics

- Gouv.ca : Programme national de certification des artificiers

Legal Code

- Légis Québec : Loi sur les normes du travail
- Gouv.ca : Code canadien du travail
- Légis Québec : Code civil du Québec
- CSN : Loi C21
- Légis Québec : Loi sur la santé et la sécurité du travail
- Canada.ca : Santé et sécurité au travail

Appendix 2 – Human resources

The professions of circus arts teacher and circus technician are not yet specifically recognized by government authorities in Quebec. However, the work being done by the *Développement de la filière de formation au Québec* (Development of circus training in Quebec) gives us the opportunity to propose responses to the requirements of these professions.

For circus arts teaching, the work done to structure the sector is documented in the Circus Teacher Certification Program offered at the École nationale de cirque (ENC).

The *circus technician* profession is still unregulated and unrecognized throughout the world. In Quebec, as a reference, we can rely on the publications issued by the Cultural Human Resources

the Cultural Human Resources Council of Canada (CHRC) entitled Riggers. However, this content does not cover skills specific to the circus arts and is reserved for CHRC members.

In France, the Centre National des Arts du Cirque in Châlons-en-Champagne offers a diploma course for *circus technicians*.

This training course offers a block of skills in acrobatic rigging. In particular, it enables you to:

- Assemble and dismantle circus apparatus compliance with safety rules and instructions;
- Plan the installation of acrobatic equipment;
- Prepare the equipment needed to set up scenic and acrobatic elements;
- Trace, install and secure anchors and rigging points;
- Assemble and/or mount various acrobatic rigs;
- Dismantle acrobatic equipment.

A chapter of competence for big tops is also available:

- Carry out or take part in the erection and/or dismantling of the big top in compliance with safety rules and instructions;
- Prepare the site for the big top;
- Receive, unload and store materials required for the big top installation;
- Implement with other technicians , under the instructions of the tent boss, the preparation and execution of the various stages of setting up a big top;
- Assemble and dismantle bleachers under the responsibility of the tent boss;
- Take part in the dismantling of the big top.

There is also a block of general technical skills which enables you to:

- Participate in the installation of lighting and sound elements on a circus stage (under the responsibility of an electrician or stage manager);
- Prepare and check lighting and sound equipment;
- Participate in setting up and making safe a lighting and sound installation;
- Dismantle lighting and sound equipment installations in complete safety.

For more information

- CHRSC : crhsculturel.ca
- CHRSC : Chartes des compétences et profils de compétences CHRC
- ICTS : Chartes de compétences pour les techniciens de scène - Institut canadien des technologies scénographiques
- ENC : Formation des enseignants - École nationale de cirque
- CNAC : Technicien de cirque - CNAC
- En Piste : Accrochage d'appareils acrobatiques - En Piste
- PJE : Productions Jeun'Est - Les stages
- CLG : Collège Lionel-Groulx - AEC Gréage

Appendix 3 – Resources & references

This list is not exhaustive, but includes references to organizations, resources and publications that we think may be of interest regarding circus arts, apparatus, their installation, use and maintenance.

Circus school

- ENC : École nationale de cirque de Montréal
- ECQ : École de cirque de Québec
- CNAC : Centre National des Arts du Cirque de Châlons-en-Champagne

Resources

- Kentika : Bibliothèque de École nationale de cirque de Montréal
- ICIMA : Chaire d'innovation cirque et marionnette
- AERISC : Association Européenne pour la recherche, l'innovation et la sécurité du cirque
- FEDEC : Fédération européenne des Écoles de Cirque
- FFEC : Fédération française des Écoles de Cirque

Technical references

- SPRAT : Society of Professional Rope Access Technicians - Formation de travail sur corde (en anglais seulement)
- IRATA : Industrial Rope Access Trade Association - Formation de travail sur corde (en anglais seulement)

Technical reference book

Note: Many of these references are in English only.

- Le grand livre des nœuds : ISBN-10 : 2070600432 ou ISBN-13 : 978-2070600434
- Lexique de la machinerie théâtrale : ISBN-10 273490070X ou ISBN-13 : 978-2734900702
- Le manuel du gréeur : Les publications du Québec : ISBN 2-551-08992-1
- Gréage et appareils de levage : ISBN 978-2-923831-13-8 (version imprimée) et ISBN 978-2-923831-06-0 (PDF)
- Pocket Ref : ISBN 1-885071-33-7
- The complete Rigger's Apprentice ISBN : 0-07-064840-9
- Stage Rigging Handbook, Third edition : ISBN-10 : 0809327414 ou ISBN-13 : 978-0809327416
- The Rigging Math Made Simple Workbook : ISBN-10 : 1733006451 ou ISBN-13 : 978-1733006453
- On rope : ISBN 9781879961050
- Splicing Handbook (V2) : ASIN : B01K9AILBU
- Standard aircraft handbook (V5): ISBN 13 : 978-0071826792
- Chapman's nautical guides : ISBN-10 : 1588160181 ou ISBN-13 : 978-1588160188
- Backstage handbook : ISBN-10 : 0911747397 ou ISBN-13 : 978-0911747393
- Entertainment rigging : ISBN-10 : 0415702747 ou ISBN-13 : 978-0415702744

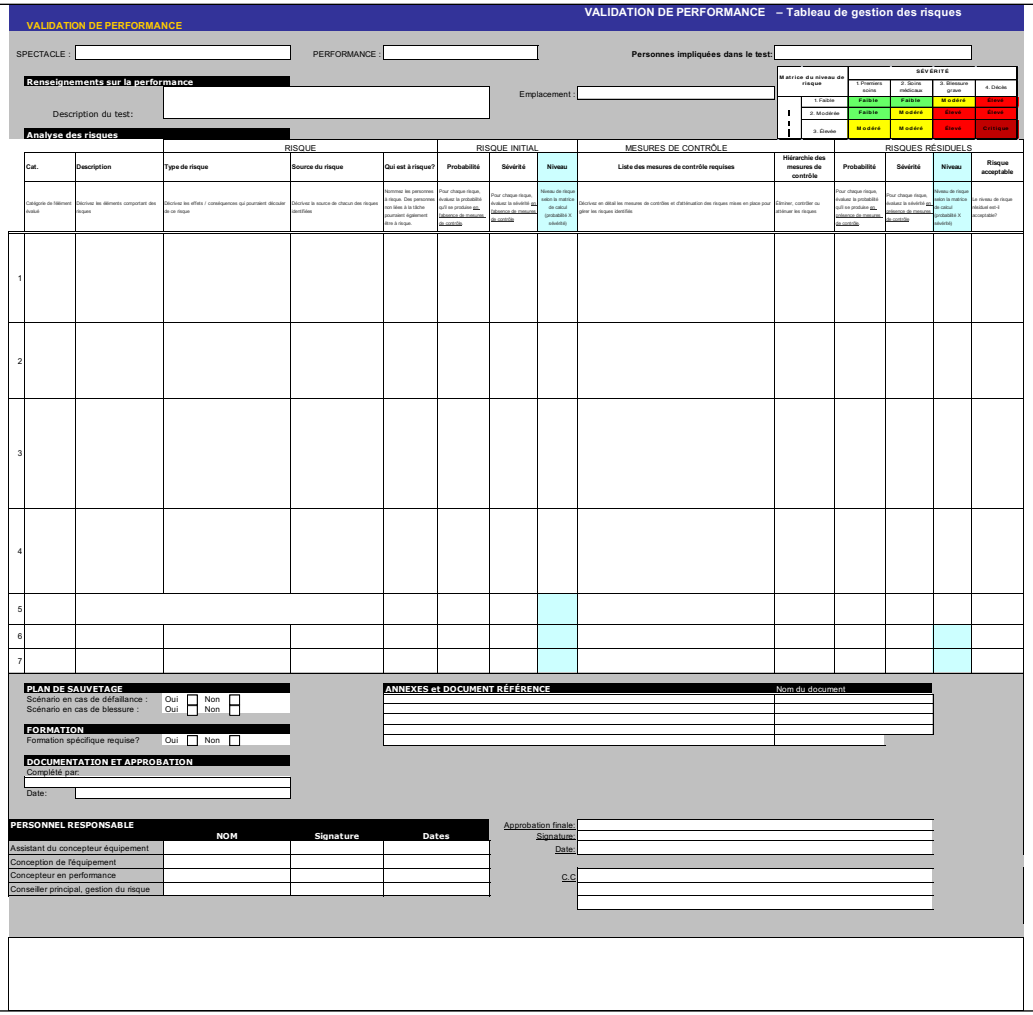
Online documentation

- FFEC : Mémento Agrès de Cirque - Conception et fabrication
- FFEC : Aménagement d'un lieu de pratique des arts du cirque
- FEDEC : Sécurité et accrochage
- ASP : Planifier le travail en hauteur, par l'Association paritaire pour la santé et la sécurité (ASP)

Appendix 4 – Template documents

This annex contains examples of standard documents used in some circus arts schools.

Risk assessment



VALIDATION DE PERFORMANCE – Tableau de gestion des risques

VALIDATION DE PERFORMANCE

SPECTACLE : PERFORMANCE : Personnes impliquées dans le test:

Renseignements sur la performance

Description du test: Emplacement :

Matrice du niveau de risque

	SÉVÉRITÉ			
PROBABILITÉ	1. Premiers soins	2. Soins médicaux	3. Blessure grave	4. Décès
1. Faible	Faible	Faible	Modéré	Élevé
2. Modérée	Faible	Modéré	Élevé	Élevé
3. Élevée	Modéré	Modéré	Élevé	Critique

Analyse des risques

			RISQUE			RISQUE INITIAL			MESURES DE CONTRÔLE		RISQUES RÉSIDUELS			
	Cat.	Description	Type de risque	Source du risque	Qui est à risque?	Probabilité	Sévérité	Niveau	Liste des mesures de contrôle requises	Hiérarchie des mesures de contrôle	Probabilité	Sévérité	Niveau	Risque acceptable
	Catégorie de blessure évalué	Décrivez les éléments comportant des risques	Décrivez les effets / conséquences qui pourraient découler de ce risque	Décrivez la source de chacun des risques identifiés	Nommez les personnes à risque. Des personnes non liées à la tâche pourraient également être à risque.	Pour chaque risque, évaluez la probabilité qu'il se produise en référence de mesures de contrôle	Pour chaque risque, évaluez la sévérité en référence de mesures de contrôle	Niveau de risque selon la matrice de calcul (probabilité X sévérité)	Décrivez en détail les mesures de contrôles et d'atténuation des risques mises en place pour gérer les risques identifiés	Éliminer, contrôler ou atténuer les risques	Pour chaque risque, évaluez la probabilité qu'il se produise en référence de mesures de contrôle	Pour chaque risque, évaluez la sévérité en référence de mesures de contrôle	Niveau de risque selon la matrice de calcul (probabilité X sévérité)	Le niveau de risque résiduel est-il acceptable?
1														
2														
3														
4														
5														
6														
7														

PLAN DE SAUVETAGE
Scénario en cas de défaillance : Oui ☐ Non ☐
Scénario en cas de blessure : Oui ☐ Non ☐

FORMATION
Formation spécifique requise? Oui ☐ Non ☐

DOCUMENTATION ET APPROBATION
Complété par:
Date:

ANNEXES et DOCUMENT RÉFÉRENCE — Nom du document

PERSONNEL RESPONSABLE

	NOM	Signature	Dates
Assistant du concepteur équipement			
Conception de l'équipement			
Concepteur en performance			
Conseiller principal, gestion du risque			

Approbation finale:
Signature:
Date:

C.C.

For more information : FFEC : Documents ressources

Appendix 4 – Template documents

Inspection and/or maintenance data sheet

INSPECTION Date:

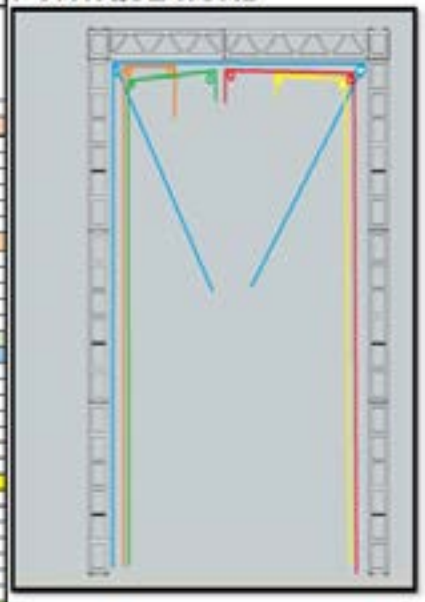
Portiques Nord

Tâches à accomplir

Inspecteur:

Assemblage	ok	Correction	NOTES
S'assurer que tous les boulons sont bien serrés.			
S'assurer qu'il y a une rondelle de chaque côté du boulon.	BON		
Ancrage au sol			
Vérifier que les 2 plaques d'ancrages sont bien boulonnées au sous-sol et que tous les washers sont présents.	BON		
Vérifier que les Tuyaux d'enfoncage sont bien fixés	BON		
Accrobatique			
Double longe Bleu		Corrections	
Poids	BON		
Swivels	BON		
Mousquetons	BON		
Poulie	BON		Harken 001
Quicklink ou manille	BON		
Sangle	BON		
Cordes	A SURVEILLER		a changé a la prochaine inspection
Ligne Jaune point a une personne			
Poids	BON		
Swivels	BON		
Mousquetons	BON		
Poulie	BON		
Quicklink ou manille	BON		
Sangle	BON		
Cordes	BON		
Ligne Verte point a 1 personne			
Poids	BON		
Swivels	BON		
Mousquetons	BON		
Poulie	BON		
Quicklink ou manille	BON		
Sangle	BON		
Cordes	A SURVEILLER	Fait	changé oct 2020
Ligne Orange point a 1 personne			
Poids	BON		
Swivels	BON		
Mousquetons	BON		
Poulie	BON		
Quicklink ou manille	BON		
Sangle	BON		
Cordes 50'	A SURVEILLER	Fait	Changé corde 1/2
Ligne Rouge TURBI Haute Charge			
Poids	BON		
Swivels large 38kn	BON		
Mousquetons	BON		
Poulie CMI	BON		
Quicklink ou manille	BON		
Sangle	BON		
Cordes 1/2" 50'	A SURVEILLER		

PORTIQUE NORD



Element a remplacer	
description	Nombre
corde 7/16	150
Poulie	2
Corde 1/2	50

- Inspection data sheet (ECQ)

Appendix 4 – Template documents

Inventaire

Nom# Tag	Sangle Noir	Inspections		Nom inspecteur
Dimension:	9'	Date	Notes	
Fournisseur	Forest F-0158	25-08-2020	Mis en service	X
Date de mise en service de la corde	25-08-2020	16.10.2020	ok	X
Longueur de laloop	9'	10-12-2020	ok	X
				X

Nom# Tag	Sangle Loop	Inspections		Nom inspecteur
Dimension:	9'	Date	Notes	
Fournisseur	Forest F-0259	08-02-2021	Mis en service	X
Date de mise en service de la corde	08-02-2021	23-06-2021	ok	X
Longueur de la loop	9'			
				

Nom# Tag	Sangle Rouge	Inspections		Nom inspecteur
Dimension:	5'	Date	Notes	
Fournisseur	Forest	170978	Inspection visuelle	
Date de mise en service de la corde	090978	090920	inspecté	X
Longueur de la loop	9'	250920	coupé a 5'	X
		190920	inspection good	X
		10-12-2020	ok	X
		23-06-2021	ok	X

Nom# Tag	Sangle loop round sling	Inspections		Nom inspecteur
Dimension:	12'	Date	Notes	
Fournisseurs		290720	information de la gaine au bas de	X
Date de mise en service de la corde	190978	10-12-2020	ok	X
Longueur de la loop	12'	23-06-2021	ok	X
				

Nom# Tag	Sangle vert Forest	Inspections		Nom inspecteur
Dimension:	9'	Date	Notes	
Fournisseurs	Forest # F-017	090920	inspecté	X
Date de mise en service de la corde	090978	16.10.2020	ok	X
Longueur de la loop	9'	10-12-2020	ok	X
		23-06-2021	ok	X

Nom# Tag	Sangle Noir	Inspections		Nom inspecteur
Dimension:	9'	Date	Notes	
Fournisseur	Forest F-0178	100920	Mis en service	X
Date de mise en service de la corde	25-08-2020	100920	ATTRIBUE A XXX	X
Longueur de laloop	9'	10-12-2020	ok	X
		23-06-2021	ok	X

- Inventory data sheet (ECQ)

Appendix 4 – Template documents

Apparatus check list

ANNEXE 6 - MODÈLE DE FICHE POUR LA VÉRIFICATION DES AGRÈS

COORDONNÉES DE L'ÉTABLISSEMENT :

Nom du responsable technique :

CARACTÉRISTIQUES DE L'ÉQUIPEMENT :

Nom :
Modèle/réf. :
N° de série :
Date de fabrication :
Date de l'achat :
Date de mise en service :
Coordonnées du fournisseur :

MUA (masse des utilisateurs appropriée) : kg
CMU (pour les accessoires de levage) : daN
CmR (Charge minimale de Rupture) : daN
Durée maximale de vie : années
Durée maximale d'utilisation : heures
Efforts transmis aux points d'ancrage :
• verticalement : daN
• horizontalement : daN

Périodicité des vérifications approfondies : mois

VÉRIFICATION APPROFONDIE :

Date :
Nom de l'intervenant :
Société ou organisme :

Nom de l'accompagnateur :
Durée d'utilisation effective à cette date : heures
Durée d'utilisation restante théorique : heures

Agrès : ☐ Neuf ☐ Bon ☐ Moyen ☐ Insuffisant ☐ Rebut
Suspentes : ☐ Neuf ☐ Bon ☐ Moyen ☐ Insuffisant ☐ Rebut
Connexions : ☐ Neuf ☐ Bon ☐ Moyen ☐ Insuffisant ☐ Rebut

Durée d'utilisation restante corrigée : heures
Date de mise au rebut :

MAINTENANCE, ENTRETIEN OU MODIFICATION :

Effectué depuis la dernière vérification :
À prévoir :

Remarques :

Incident report

Circonstances de l'incident (suite de la page 1)

Suite de la chronologie de l'accident

Genre de blessure et interventions faites

Partie du corps blessée ou atteinte

Page 2

Equipment & apparatus verification sheet / Hors les Murs / Agrès de cirque conception et fabrication / Page 69

Appendix 4 – Template documents

Incident report- Page 1

ÉCOLE DE CIRQUE DE QUEBEC

RAPPORT D'ACCIDENT

Identification du/de la blessé-e :

NOM	
ADRESSE	
TÉLÉPHONE	
ÂGE	
SEXE	

Moment de l'accident :

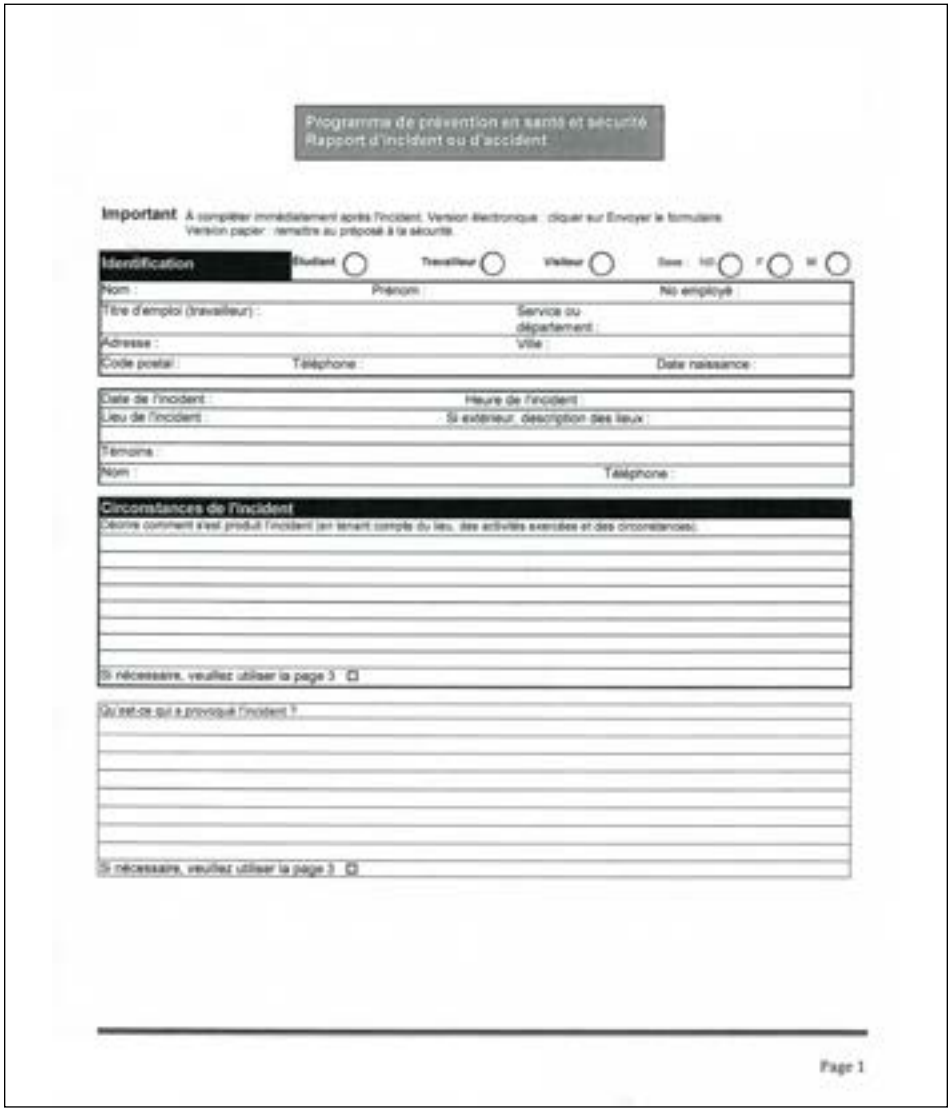
DATE	
HEURE	
SUR QUEL APPAREIL	
LOCALISATION ET NATURE DE LA BLESSURE	
COMMENTAIRES	
TÉMOIN	
PREMIERS SOINS REÇUS PAR QUI ET QUOI	

Personne qui a fait le rapport :

NOM	
FONCTION	
DATE	

Accident report / ECQ

Incident report - Page 2



Programme de prévention en santé et sécurité
Rapport d'incident ou d'accident

Important À compléter immédiatement après l'incident. Version électronique : cliquer sur Envoyer le formulaire.
Version papier : remettre au préposé à la sécurité.

Identification Étudiant ◯ Travailleur ◯ Visiteur ◯ Sexe : H/G ◯ F ◯ M ◯

Nom : Prénom : No employé :

Titre d'emploi (travailleur) : Service ou département :

Adresse : Ville :

Code postal : Téléphone : Date naissance :

Date de l'incident : Heure de l'incident :

Lieu de l'incident : Si extérieur, description des lieux :

Témoins :

Nom : Téléphone :

Circonstances de l'incident

Décrire comment s'est produit l'incident (en tenant compte du lieu, des activités exercées et des circonstances).

Si nécessaire, veuillez utiliser la page 3 ☐

Qu'est-ce qui a provoqué l'incident ?

Si nécessaire, veuillez utiliser la page 3 ☐

Page 1

Accident report / ECQ

Appendix 4 – Template documents

Incident report- Page 3

Genre de blessure et interventions faites — Si nécessaire, veuillez utiliser la page 3

(ex. : brûlure, coupure légère, éraflures, corps étranger, écrasement, etc.)

Partie du corps blessée ou atteinte :

Abandon du travail (travailleur) Oui Non

Abandon des cours (étudiant) Oui Non

Premiers soins reçus Si refus des soins, cocher

Je, soussigné(e), certifie que les renseignements contenus dans cette déclaration sont vrais et conformes à ce qui s'est réellement produit.

Signature de l'accidenté :	Date:	Heure:	Téléphone:
Signature du témoin :	Date:	Heure:	Téléphone:
Signature de l'enseignant (si étudiant) :	Date:	Heure:	Téléphone:
Signature d'un membre (comité SST) :	Date:	Heure:	Téléphone:

CORRECTIFS *(à compléter par le responsable du suivi et le Comité SST)*

Action(s) corrective(s) implantée(s)	Responsable	Début (prévisions)	Fin (prévisions)	Efficacité Oui	Efficacité non

INFORMATION AU REQUERANT *(à compléter par le responsable du suivi et le Comité SST)*

Intervention(s) de suivi	Responsable	Début (prévisions)	Fin (prévisions)	Satisfaction Oui	Satisfaction Non

Pour envoyer le formulaire dûment complété aux membres du Comité de santé et de sécurité (CSS)

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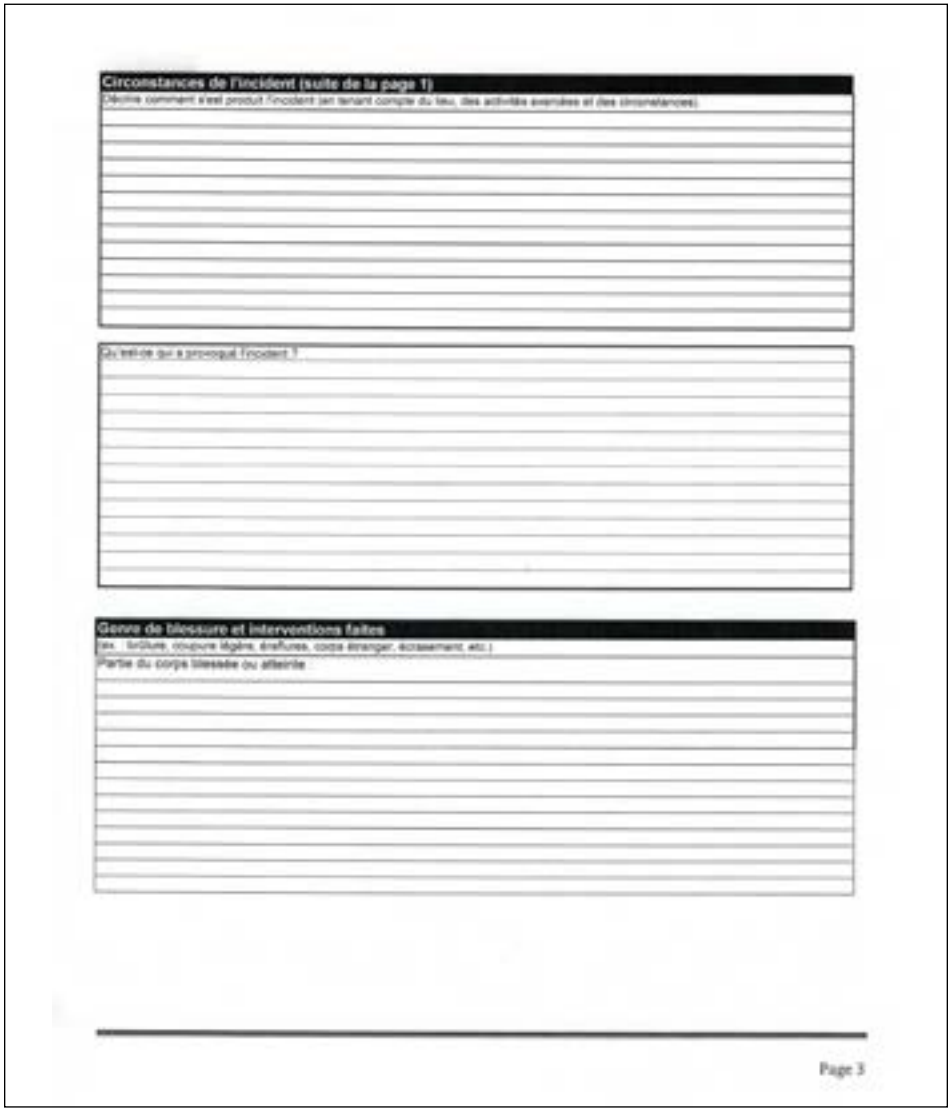

Circonstances de l'incident (suite de la page 1)

Décrire comment s'est produit l'incident (en tenant compte du lieu, des activités exercées et des circonstances).

Qu'est-ce qui a provoqué l'incident ?

Genre de blessure et interventions faites

(ex. : brûlure, coupure légère, éraflures, corps étranger, écrasement, etc.)

Partie du corps blessée ou atteinte :

Page 3

Accident report / ECQ

Appendix 5 – Terminology and units of measure

The following is a non-exhaustive list of terms specific to the circus arts. The terms are grouped into two categories: 'technical equipment", and "terminology and units of measurement".

Technical equipment:

Anchor: An appropriately rated plate or attachment point on the floor or wall to which guy wires, lunges and other fixtures are attached.

Bungee Lunge: Single or double lunge connected to a fixed anchor on the ground with a bungee pack and a lowering system. This system offers an additional level of safety. (See pages 83 to 89).

Lunge: safety system connected to a lunge belt, generally consisting of one or two ropes operated by a qualified teacher or lunge operator. It is a mechanical prevention device used to absorb or cushion student falls or to aid particular movements.

Hand loop: Term used in the circus world. This is a closed loop of webbing or sling with a sliding locking stopper. For added security a safety ring can be included.

Round sling: A ring or loop made of rope, webbing, elastic or steel whose two ends are spliced together. Also known as a sling.

Foam pit: Permanent sunken pit filled with foam cubes. In gymnastics, this system is used to train various acrobatic figures.

Technical grid: Permanent metal structure suspended from the ceiling, used to attach show lighting, sound elements and props. When installing acrobatic equipment it is advised to have an independent grid.

Guy wire: Rope or wire cable used to position, stabilize or render static an apparatus, a piece of acrobatic equipment or a structure such as a spreader bar, truss or free-standing structure.

Spreader bar: Structure for rigging aerial apparatus requiring greater stability. Equipped with bearings for swinging apparatus such as the swinging trapeze, cloud-swing etc. Can also be used for static apparatus like doubles trapeze, etc.

Block and tackle advantage system: Lifting system including multiple pulleys to reduce the effort required to lift a load or apply tension. The mechanical advantage obtained is proportional to the number of ropes and pulleys used.

Chain and cable hoist: A lifting or pulling device fitted with a reduction gear or speed reducer and connected by a cable or chain to a hook that lifts a load vertically. Cable tensioners used to tension wire are generally known as Tirfor® (registered trademark).

Spotting: Is the action of ensuring the safety of the student when learning an acrobatic movement by intervening physically (parrying or supporting) or with spotting mats.

Ratchet-strap: A piece of equipment generally found in the world of rigging and transportation used to securely fasten cargo during transport. In circus arts they are generally used as traction and tensioning elements to adjust and tension the guy wires.

Tirfor®: See chain and cable hoist.Termes techniques et mécaniques.

For more information

- CNAC : Glossaire
- Circus Parade : Lexique du Cirque- Circus Parade - Dominique Denis

Appendix 5 – Terminology and units of measure

Terminology and units of measurement

These data and characteristics are used to evaluate installations. They provide a margin of protection against unforeseen events such as wear, fatigue and impact, in a context of unconventional use.

- **W.L.L:** Working Load Limitor S.W.L Safe Working Load (C.m.U: Charge maximale d'utilisation) This indicates the maximum load that lifting equipment can support in normal use (hoist, hook, sling, cable rope, pulley, carabiner etc.). This is the maximum capacity at which the equipment can be used without the risk of deformation or compromising its initial capacity. Under no circumstances should the maximum working load be exceeded.
- **B.L:** Breaking Load (or M.B.L and M.B.S for Minimal Breaking Load / Minimal Breaking strength). This is the load that causes a piece of equipment to break or deform. The breaking load must always be divided by an appropriate safety or working coefficient.

Safety factors are defined by the rules of the art for each field and may be codified in standards for certain fields of application (For example this factor is 5:1 for industrial lifting and 10:1 for human lifting). It is also known as the design factor or coefficient, or the utilization factor or coefficient.

- **Safety factor or coefficient:** Is the coefficient calculated between the Breaking Load (B.R) and the Working Load Limit (W.L.L).
- **Dynamic factor (or dynamic load):** is the multiplication of force due to acceleration or deceleration. These are the loads generated by the artists on the apparatus and aerial systems. The dynamic factor is also called G-force, which is the acceleration vector.
  In human lifting, even when static, the dynamic factor to be considered is a minimum of 2. It reaches 3 to 5 with common acrobatic movements. It can reach 7 in certain disciplines with participants of a high acrobatic level.

Units of measurement

While the International System of Units (SI), based on the metric system, is the most widely used system of units in the world, and has been ratified by many countries (except the USA, Liberia and Burma), imperial measures are still widely used in Québec.

- **Gram:** international unit abbreviated to “g” (g x 1,000 = 1 kilogram or “Kg”, g x 1,000 = 1 tonne or “t")
- **Kilogram-force:** unit abbreviation is “kgf”. (1 kgf = 9.80665 N)
- **Pounds:** unit abbreviation is “lb”. In French Livre. (1 lb = 453.5924 g)
- **Pound-force:** in French Livre-force, abbreviated to “lbf”. (1 lbf = 4.448222 N)
- **Length:** distance between two points, length of a straight segment, length of a curved segment, etc.
- **Mass:** Mass represents the amount of matter in a material or object. Scientifically measured in grams.
- **Meter:** international unit abbreviated to “m”. (1m= 3ft 3.37) in.
- **Nautical mile:** in French "nautical mile" (1 NM = 1852 m)
- **Mile:** in French "mille" (1 mile = 1609.344 m)
- **Newton:** International unit abbreviated as “N".
- **Foot:** in French "pied" (1 ft = 30,48 cm)
- **Weight:** measure of force with which a body is attracted to Earth. Scientifically measured in newtons "N".
- **Inch:** In French "pouce" (1 in = 2.54 cm)