



PROLYTE PRODUCTS

Read this manual carefully and understand all of it's contents before you assemble the ProlYTE Roof and outdoor structures.



Photo: Studio Beran, Serbia

ASSEMBLY MANUAL FOR PROLYTE ROOF- AND OUTDOOR STRUCTURES

Version 2, January 2010

Industriepark 9, 9351 PA Leek, The Netherlands
phone: +31 (0)594 85 15 15, fax: +31 (0)594 85 15 16
e-mail: info@prolyte.com, website: www.prolyte.com

CONTENTS

1.	PREFACE.....	4
2.	INTRODUCTION	4
3.	PRINCIPAL RESPONSIBILITIES.....	5
	3.1 GENERAL	5
	3.2 RESPONSIBILITIES OF CLIENTS, VENUE OWNERS AND EVENT ORGANIZERS.....	5
	3.3 THE CLIENT SHOULD:	5
	3.4 RESPONSIBILITIES OF DESIGNERS AND CONTRACTORS.....	5
4.	HAZARDS AND RISKS RELATING TO DEMOUNTABLE STRUCTURES.....	6
	4.1 HAZARDS	6
	4.2 DESIGN HAZARDS.....	6
	4.3 ERECTION ON DISMANTLING HAZARDS	6
	4.4 OPERATIONAL HAZARDS	6
	4.5 RISK ASSESSMENT	6
5.	STEPS TO MINIMIZE RISKS.....	7
	5.1 DESIGN.....	7
	5.2 ERECTION AND DISMANTLING	7
6.	PROCUREMENT AND USE.....	7
	6.1 GENERAL	7
	6.2 SPECIFICATION OF REQUIREMENTS	7
	6.3 INFORMATION CHECKLIST.....	7
	6.4 MANAGEMENT CHECKLIST.....	8
	6.5 COMPLIANCE WITH REGULATIONS	8
	6.6 DESIGN AND CHECKING	8
	6.7 EQUIPMENT CHECKING.....	9
7.	DOCUMENTS.....	9
8.	USE	9
	8.1 SUPERVISION DURING THE EVENT	9
	8.2 ELECTRICAL INSTALLATIONS AND LIGHTNING PROTECTION	9
	8.3 LIGHTNING PROTECTION	9
	8.4 IN-SERVICE INSPECTION AND MAINTENANCE	10
9.	GROUND AND SITE CONDITIONS	10
	9.1 WOOD PADS / SPREADERS	10
	9.3 SLOPING GROUND.....	11

CONTENTS

10.	WIND CONDITIONS.....	11
	10.1 USE OF SCRIM	11
	10.2 BEAUFORT SCALE.....	12
11.	ERECTION, INSPECTION AND DISMANTLING	13
	11.1 PLANNING	13
	11.2 WORK ON SITE ERECTION OF STRUCTURE	13
	11.3 BRACINGS AND CONNECTIONS.....	13
	11.4 SAFETY OF OPERATIVES	13
	11.5 INSPECTION OF STRUCTURES	13
	11.6 LOCAL AUTHORITY	13
	11.7 ERECTION CHECK	13
	11.8 DISMANTLING	14
	11. 9 INSPECTION OF COMPONENTS	14
12.	IDENTIFICATION	14
	12.1 STRUCTURE COMPONENTS	14
	12.2 CANOPIES.....	14
	12.3 BALLAST	15
13.	ASSEMBLY.....	15
	13.1 GENERAL INFORMATION	15
	13.2 CANOPY	15
	13.3 LIFTING.....	15
	13.4 USE OF WINCHES / HOIST	15
14.	LEGISLATION.....	16
15.	INSPECTION.....	17
	15.1 GENERAL	17
	15.2 INSPECTION CRITERIA.....	17
	15.3 INSPECTION FREQUENTLY	17
	15.4 RECORDS.....	17
	15.5 REPAIRS AND REMOVAL FROM SERVICE	17
	15.6 STEEL WIRES AND CHAINS	17

1. PREFACE

This preface explains how to interpret the symbols and text styles in this manual.

Warnings and cautions contain important information that can protect you, the trusses, and the construction. Always read warnings and attentions.

Notes contain additional information. Some notes contain basic information for inexperienced users.

Others provide extra information or tips for experienced users.

WARNING!

The information in a warning protects against bodily harm or loss of life

CAUTION!

The information in an caution protects against damage to the truss or optional external parts

NOTE

The information in a note provides supplementary information for inexperienced or advanced users

This manual has been written for all the users of the PROLYTE outdoor systems. Make sure that you read and understand this manual completely before using a roof-system or any outdoor structure built outdoors. This manual should be available for everyone assembling, disassembling or loading roof-systems. Save this manual for later use. At request, we can send you an additional manual.

2. INTRODUCTION

Temporary outdoor structures are widely used under all kinds of conditions and circumstances.

Prolyte Temporary outdoor structures provide a temporary roof above a mobile or stationary stage.

This roof or temporary structure serves two main purposes:

- To provide shelter from environmental influences to people and equipment.
- To provide a support structure for commonly used equipment such as lighting, sound systems and scenery.

PROLYTE roof systems are built from standard components that are series-produced by Prolyte Products in Leek, The Netherlands. These components are certified by the TÜV and compliant with German and European standards.

WARNING

- Make sure the Prolyte outdoor structures are build of genuine Prolyte components, which are clearly and positively identified as Prolyte products. Copies do exist and, even though fitting to Prolyte trusses, they do not have identical strength and safety characteristics.
- They are standard calculated without the actions like snow- or seismic loads acting on the structure.
- Always wear personal safety equipment while assembling or disassembling.



3 PRINCIPAL RESPONSIBILITIES

3.1 GENERAL

The general requirements for health and safety relating to demountable structures are the same as for permanent structures: a demountable structure should be part of a safe and healthy environment for those using it and should not give rise to risks to the health or safety of users, nor to those involved with the erection, maintenance or dismantling of the structure. It is the responsibility of all those concerned with such structures to exercise care in their work and in all matters relating to the safety of the people who may be using them.

3.2 RESPONSIBILITIES OF CLIENTS, VENUE OWNERS AND EVENT ORGANIZERS

Primary responsibility for the safety of people attending an event and of the users of temporary demountable structures lies with the client. The client cannot pass on responsibility for safety to any third party. The owner of the premises where the event is located also has responsibilities relating to safety. The client should make sure that competent people are employed to design, supply and erect temporary demountable structures. The client is responsible for assuring the safety of users of temporary demountable structures through the management and control of users before, during and after an event. It is important that responsibility for the safe procurement, erection, use and dismantling of demountable structures be clearly defined in writing at the outset in order to prevent any misunderstanding of the respective roles of the client and any other party.

3.3 THE CLIENT MUST:

Make sure that requirements for safety in use are met. Oversee and monitor procurement, including the provision by the contractor of erection drawings and accompanying calculations, design loads and any relevant test results. If the client does not have appropriate technical expertise, it should consider appointing a competent person to advise it, who may act as the client's agent for the purposes of statutory compliance.

Give the appropriate authorities adequate notice of the proposed use of the structure and when it will be accessible for inspection before use. This is the responsibility of the client or the client's agent. The event organizer is responsible for overall safety coordination before and during the event.

Have in place procedures for dealing with severe weather conditions during an event, including but not limited to strong winds and heavy rain. This obligation notwithstanding, contractors and suppliers of temporary demountable structures have seen

little change in clients' approach, and responsibility for safety has been tacitly delegated to contractors and suppliers. The applicable laws clearly state that clients' responsibilities cannot be passed on to third parties. Written method statements for erection and dismantling, including for methods of founding evenly on the ground, should be prepared by the contractor and given to the client for further transmission to all relevant parties, including the local authority, if required.

3.4 RESPONSIBILITIES OF DESIGNERS AND CONTRACTORS

It is only by assessing all the relevant scenarios that the designer or contractor can be sure that the accident risk has been taken into account. This Manual recommends that in considering occupancy, means of access and means of escape, designers and contractors should familiarize themselves with the environmental and technical infrastructures of the venue or building in which the temporary structure is to be erected, together with its management and information systems. In particular, they should identify safety problems by evaluating hazards and risks and should make sure that temporary structures are properly designed with full regard to their surroundings. A risk assessment should be completed in all cases.

All structures must be properly designed by a competent person. The designer should be able to provide evidence of his/her competence. Structural safety and the safety of users should be equally accounted for. The installation of a temporary structure should not compromise the safety of the existing environment.

An increasing number of Eurocodes and European standards is becoming available. These provide extensive information applicable to temporary demountable structures. Independent checks of the design of temporary structures should be arranged by the contractor and charged to a chartered engineer with the appropriate level of skills and experience. Such checks may be carried out on a standard system (which may be based on a design or have evolved on an empirical basis) or on the design of any special or non-standard arrangement of elements supplied for a project. Once the structure has been erected, a final, independent check should be carried out by a competent person, such as an employee of the structure supplier or someone nominated for this purpose by the contractor. Where the final check is carried out by a member of the setup team, evidence of that person's competence should be provided.

4. HAZARDS AND RISKS RELATING TO DEMOUNTABLE STRUCTURES

4.1 HAZARDS

The public expect safety in their day-to-day environment and do not take account of the risks that may be present. Hazards are generally defined as circumstances that have a potential to cause harm. A risk is defined as the likelihood that a hazard will be realized. The process of assessing hazards and risks deals with the questions: What if...? How likely is it that...? What are the possible consequences of...?

4.2 DESIGN HAZARDS

During the design process, hazards may unknowingly be incorporated into a structure that, if not detected, could pose a danger to the people erecting the structure and to the users. Such hazards may be due to errors on the part of the designer, e.g. non-compliance with current good practice, failure to appreciate operational requirements, or limitations in available knowledge. Hazards can be mitigated through appropriate quality assurance and design checks. In addition, the design team should include competent persons who understand the nature of the use to which the temporary demountable structure will be put.

4.3 ERECTION ON DISMANTLING HAZARDS

Hazards caused during setup may result from factors such as human error, time pressure, inadequate lighting, tired operatives and malfunction of equipment. If they are not detected, such hazards can present a danger to operatives erecting the structures and to users. They can be avoided by building appropriate controls into the specifications and setup documents (e.g. method statements), by training operatives, by carrying out inspections and checks during erection and by the final independent erection check. Hazards may also occur during dismantling. The principal hazards to safety during setup and dismantling include:

- Non-compliance with design and setup documentation
- Non-compliance with good practice
- Power or equipment failure
- External event, e.g. fire, explosion, vehicle impact, wind

4.4 OPERATIONAL HAZARDS

When setup is complete and the facility is open to users, a different set of hazards exists. If the facility has been properly designed and erected, such hazards will generally be the result of external influences. Pre-planning at all stages will minimize their effect. Principal operational hazards include:
Structural:

- Overloading, structural failure or collapse

Vehicle impact:

- Extreme external events, e.g. flood, wind, snow, earthquake, lightning
- Structural damage from any cause

Crowd behaviour:

- Overcrowding
- Vandalism or violent criminal behaviour
- Excitement, demonstrations or incitement of a crowd; fire or explosion
- Power loss leading to systems failures
- Spillage of dangerous substances
- Medical emergencies
- Accidents

Each hazard should be considered both on its own and in association with any secondary hazards.

For example, an explosion may be followed by fire, power failure, overcrowding at exits and medical emergencies. Various scenarios are possible, even if many are highly improbable. The risks associated with a hazard or series of consecutive hazards should be assessed.

4.5 RISK ASSESSMENT

All employers are required to carry out an assessment to identify hazards and risks that could cause injury to employees or the public. Self-employed people are likewise required to carry out an assessment of their work practices. Whenever significant changes are made to work procedures, those assessments need to be reviewed. Where an employer employs five or more people, any significant findings should be recorded and especially vulnerable people identified. The risks associated with any given hazard depend on a number of factors:

- The probability of an incident and a series of secondary events occurring.
- The effectiveness of measures to protect against the hazard and to control an incident.
- The direct consequences if an incident occurs and the indirect consequences afterwards.

Adopting a sensible approach as regards the likelihood of an incident and taking precautions to maximize protection and minimize the consequences may additionally help to reduce costs. Assessing the consequences of an adverse incident is both a human and a commercial matter. The fact that disasters are remembered by the names of their locations signifies that the link with that particular site is strong.

It may take many years for a venue that has been the site of a major incident to recover its popularity and prosperity. Direct consequences (e.g. death, injury, property damage) are followed by indirect consequences (e.g. financial losses, damage to reputations, increased insurance premiums).

Recognizing that very serious consequences follow any

major incident promotes safe practices. Where removal of the risk arising from a hazard is not reasonably practicable, it should at least be minimized. Risk assessment should be based on past experience as much as possible, which requires keeping records of performance for both types of events and individual contractors. Information from people with previous experience with demountable structures, such as local authorities, emergency services, insurers, engineers, event organizers and facility managers, may also be valuable. It should be appreciated that providing a generic checklist to cover all temporary demountable structures it is simply not practicable.

5. STEPS TO MINIMIZE RISKS

5.1 DESIGN

The design of temporary structures should generally comply with existing standards. Design documentation should set out the design criteria for the structures, and engineering documentation should include a clear summary of the structure's design parameters and operating limits. The design stage should take a proactive attitude to safety: many potential hazards can be envisaged, the risks assessed and plans made accordingly. In some cases, a risk may be so great that an alternate solution is necessary. For example, in selecting the site for a temporary demountable structure, the presence of live overhead electricity cables or access difficulties for users may dictate a change in the event site. Hazards that could affect the safety of a structure should be recorded in a checklist or operational manual, providing a reference for checks carried out on the structure during use.

5.2 ERECTION AND DISMANTLING

Setup of demountable structures has its own hazards. Most of these primarily affect site operatives, but some may also affect users of the facility. Safety margins may be eroded if recommendations in this Manual and other relevant guideline documents are not followed. Responsibility for setup should be very clearly defined, preferably through appropriate wording in the contract. Specifications must be unambiguous and coordinated with the setup drawings. All temporary structures require sound materials and good construction, meaning they need to be properly fabricated and properly founded and supported. If the client proposes alterations to the agreed design, the contractor and the competent person responsible for the design should approve these alterations. Such changes should be subject to a further independent design check. Before opening a structure to users, a competent person should be called in to carry out an independent erection check. This is particularly important if the structure has been erected at short notice.

6. PROCUREMENT AND USE

6.1 GENERAL

The procurement of a demountable structure and its use should be an integral part of the planning, management and supervision of the event for which it is required. It is the client's responsibility to provide temporary structures (and exits) that are safe for their users. Both the proposed event and the demountable structures erected for the event should be assessed for risks, with the client carrying out the risk assessment for the event and the contractor carrying out that for all aspects of the provision of the structure. Once the structure has been handed over, responsibility for its management passes to the client. The safe and efficient procurement of temporary demountable structures places the following principal responsibilities on the client:

- Ensure that competent persons are employed to design, erect, inspect and dismantle the structure. Agree the expected nature and character of spectator activity at the event.
- Provide the contractor with detailed information; see the information and management checklist below.
- Recognize the need to obtain the relevant enforcing authority approvals in good time.
- Appoint a competent person to provide technical advice.
- Make sure that a safety plan is in place.
- Appoint a safety coordinator, and security staff who are properly trained and briefed.

Last minute modifications cause many problems. Such changes should be avoided, but where they are unavoidable the contractor, the enforcing authority and the client or client's agent should agree on modifications. The modified design should be subject to a new independent design check, unless the changes are within the scope of the original design. The modification and basis for the agreement should be recorded.

6.2 SPECIFICATION OF REQUIREMENTS

The client should provide the contractor for the demountable structure with a written technical specification of the requirements.

6.3 INFORMATION CHECKLIST

Information provided by the client may include, among other details, the following:

- Site of event and location of the demountable structure at the site.
- Type and details of event, e.g., sports, theatre, festival, conference, concert.
- Programme for supply of structure, e.g. date required, date by which structural calculations

and drawings are required for comment, erection timescale, any limit to working hours.

- Type of structure required, e.g. grandstand, marquee, stage; with/without roof.
- Size and weight of equipment to be supported by the stage and roof (where applicable).
- Accommodation needed on and in the structure, e.g. floor area, number of seats, sightlines, access to stage structure.
- Public access routes to site; public evacuation times during the event.
- Access to site for erection and dismantling.
- Ground conditions, e.g. flat or uneven ground, hard standing, soft ground.
- Enforcing authority contacts (building control, environmental health and fire officers) to ascertain licensing and approvals requirements.
- Fire risk factors.

6.4 MANAGEMENT CHECKLIST

The following requirements will help ensure that temporary demountable structures are procured and used efficiently and safely:

- Responsibility for design and erection of the structure and its foundations should rest with the contractor. People with suitable training and experience should carry out erection and dismantling. Design calculations and drawings or a type approval, together with the independent design check, should be submitted to the client or client's agent.
- The structure should be designed by competent persons using accepted engineering principles and should comply with all relevant standards and guideline documents, as well as with the specification requirements.
- Any alteration should be subject to a further independent design check.
- The contractor and the event organizer should be able to provide proof of public liability insurance cover.
- The structure and its foundations should be protected from vehicular traffic, where necessary.
- After it has been erected, the structure should be subject to a documented erection check by a competent person.
- The structure should be maintained to be fit for use at all appropriate times.
- The client should carry out or arrange for others to carry out periodic inspections and require the contractor or other competent person to undertake appropriate repairs and remedial work as necessary.

6.5 COMPLIANCE WITH REGULATIONS

It is always the client's responsibility to contact the enforcing authority to inform it of proposals for a temporary structure, and to seek advice on responsibility as regards any requisite enforcement, certificates, licenses and permissions, as well as regarding any special local regulations that may apply. Where an event is required to be licensed, the enforcing authority will check the calculations and drawings. When applying for a license for an event, the client should notify the enforcing authority about which contractor(s) will be supplying the structures. The enforcing authority will then ask the client for the required technical information. It is the client's responsibility to supply all technical information requested by the enforcing authority in good time before erection starts. Enforcing authorities should raise any queries on the design sufficiently ahead of the start of erection to give the contractor time to deal with any problems. This is a key requirement for any risk assessment and method statement.

Design documentation and technical information should in general be provided at least 14 days before erection starts, and the enforcing authority should respond in writing at least 7 days before erection starts. However, by their nature, temporary structures must often be supplied at very short notice. It is not unusual for an enquiry to be made, an order placed, the structure erected, the event held and the site cleared, all within less than a week. The enforcing authority may also wish to inspect the structure during and/or after erection to verify that its construction complies with the approved details, that it does not obstruct any exit routes and that, insofar as is reasonably practicable, it does not lend itself to misuse by the public. Contractors should never use appraisal by the enforcing authority as a basis for reducing their own checking procedures.

6.6 DESIGN AND CHECKING

Calculations for the structure and requirements for the foundations of temporary structures, whether they are proprietary systems intended for repetitive use or unique designs, and with the exception of small tents, should be prepared by a competent person. Where the structure is used repetitively, and provided that no changes are made to it, design calculations that have been subject to an independent check should be acceptable without further checking by each enforcing authority. Design documents should be provided that cover the key aspects of the design. If any of these documents are not applicable, this should be clearly stated by the client/agent or designer, as appropriate.

6.7 EQUIPMENT CHECKING

Equipment should be checked by the contractor to make sure that it is fit for its purpose and fully meets any specification that has been laid down. Please



refer to our product manuals for inspection criteria. All components should be examined during assembly and dismantling for signs of wear, deformation or other damage, and replaced if necessary. Correct alignment of components is important. Particular attention should be paid to fastenings and connections. It is essential to provide suitable covering for bolts and fittings that project into or adjoin public areas.

7. DOCUMENTS

INDEPENDENT ERECTION CHECK AND COMPLETION CERTIFICATE

The client should make sure that a competent person has checked all structures after every erection and before use, to be certain that they conform to the relevant drawings and specified details. The client should verify that the checks have been carried out effectively by the contractor and have been recorded on the completion certificate designed for this purpose. As a minimum, this should detail the type and location of the structure, the date of the inspection, the name and position of the competent person making the inspection, reference numbers or methods of identifying the design or erection drawings and the nature of the inspection (physical, visual etc.), as described in the Erection Check documents. This certificate should be handed over to the client, if necessary, who in turn should keep it for inspection by the enforcing authority. If structural modifications are required after the completion certificate has been handed over, the following course of action applies:

1. A competent person should redesign the structure to take account of the modifications.
2. This design should then be subjected to an independent design check.
3. A setup check should be carried out.
4. A new completion certificate should be prepared once the modifications have been made.

If an enforcing authority requires structural modifications, written details of the changes required and the reasons for them shall be issued to the competent person appointed to redesign the structure. The course of action detailed above applies.

In all cases the structure should comply fully with the design criteria before users are admitted into it. If structural modifications are required by an Enforcing Authority, written details of the changes required and the reasons for them shall be issued to the competent person who is to redesign the structure. The course of action detailed above shall be followed. In all cases the structure should comply fully with the design criteria before users are admitted to it.

8. USE

8.1 SUPERVISION DURING THE EVENT

Good management is essential to ensure the safety of users of temporary demountable structures. Key aspects that should be considered in planning supervision during an event include the following:

- The safety coordinator should monitor the event and take action as necessary to make sure that demountable structures are used as planned and that safety is not compromised or jeopardized.
- Users should not be admitted to a demountable structure until the safety coordinator is satisfied that it has been properly erected and complies fully with the design criteria.
- No structural members forming any part of a temporary demountable structure should be removed during use.
- The number and distribution of users for which a structure has been designed should not be exceeded.
- Sufficient stewards should be appointed to each structure by the client to safeguard spectators. They should be appropriately trained beforehand, be directed by a safety officer/coordinator and be briefed on safety and fire drills and their specific duties on the days of the event.

8.2 ELECTRICAL INSTALLATIONS AND LIGHTNING PROTECTION

Electrical installations in temporary structures should be adequately earthed in accordance with normal standards. Consideration should be given to the degree of exposure and likely risk of strike by lightning and, where appropriate, the structure itself should be adequately bonded or earthed. Advice on earthing and lightning protection should be sought from an electrical engineer. In ground-supported constructions the main grid is quite often isolated to the towers because of the use of plastic or rubber castors in sleeve blocks. Thus the main grid needs to be earthed separately.

8.3 LIGHTNING PROTECTION

Electrical installations in temporary structures should be adequately earthed in accordance with normal standards. Consideration should be given to the degree of exposure and likely risk of strike by lightning and, where appropriate, the structure itself should be adequately bonded or earthed. Advice on earthing and lightning protection should be sought from an electrical engineer. In ground supported constructions the main grid is quite often isolated to the Towers because of the use of plastic or rubber castors in sleeve blocks. Thus the main grid need to be earthed separately.

8.4 IN-SERVICE INSPECTION AND MAINTENANCE

Inspection and maintenance procedures need to be properly determined, specified and understood by the client and contractor. The client should make sure that a competent person inspects the demountable structure before use in order to check that it is in sound condition or to arrange for any remedial work needed. Some demountable structures remain in use for considerable lengths of time and particular attention may need to be paid to their long-term condition; in some cases, requirements that apply to permanent structures will need to be considered. The structure should be inspected regularly by a competent person to ascertain whether any significant movement or differential settlement has occurred. If significant movement is evident, a report should be submitted immediately to the client and/or contractor, as appropriate. Remedial work will then be required, possibly involving repacking and levelling or installing another type of foundation. The contractor should check that the structure has sufficient redundancy to allow remedial work to proceed without endangering overall stability.

9. GROUND AND SITE CONDITIONS

The allowable bearing pressure on the ground is the pressure that can safely be applied to the ground. The type of subsoil is of significant importance to the allowable bearing pressure. Particular care should be taken for:

- Ground conditions after heavy rain.
- Frozen or dried out surfaces.
- Structures supported on bituminous, concrete or similar hard standings. It is important to realize that the thickness and type of underlying material are critical to the ability of the surface to support load.

The following table provides an indication of ground bearing pressures for temporary structures that are in place for less than 3 months.

Bearing material	allowable bearing pressure	Wood pad 250x250x21 mm
	kN/m ²	kN
Dense Sand	200	27
Medium dense sand	150	18
Loose sand	75	6
Stiff clay	150	15
Firm clay	75	7,5

In the absence of reliable local or professional engineering knowledge, an allowable pressure not exceeding 50kN/m² should be assumed.

9.1 WOOD PADS / SPREADERS

The normal method of supporting temporary demountable structures is to place timber spreaders on the ground and then use scaffolding screw jacks with soleplates to level up the structure. Special heavy-duty base plates are sometimes used for temporary demountable structures; these are larger, stiffer and stronger than conventional scaffold. They are usually associated with hospitality box structures and the like, where conventional structural sections are used as the main load bearing columns. In certain circumstances, timber spreaders are not required, however this can only be where good quality concrete, asphalt or other known surfacing can be relied on to safely support relatively light loadings.

Experience has shown that timber spreaders may be placed directly onto grassed surfaces underlain by ground of adequate bearing capacity. However, wherever structures are placed on grassed slopes, the turf/topsoil should be excavated locally to provide horizontal bearing beneath the spreader. Base plates and spreaders should be engineered and their size and distribution not left to chance. Design calculations should be prepared to show how the leg loads are transferred to the ground. Experience has shown that the use of either scaffold boards or railway sleeper spreaders is generally satisfactory. Concentrated soleplate/base plate loads should be assumed to spread through the timber spreader at 2 horizontal to 1 vertical along the grain, and 1 to 1 across the grain unless directed otherwise by calculation. For heavy leg loads, the provision of a grillage of spreader timbers may be necessary. The contractor should inspect base plates for damage before each use. They should be positioned centrally under the load unless indicated otherwise in the design documentation. Failure to comply with this requirement may result in bearing stresses far in excess of calculated values, leading to local overstress of the ground and unacceptable differential settlement of the structure.

9.2 GROUND ANCHORS

Several types of proprietary ground anchor are available. Manufacturers of ground anchors usually provide data on safe working loads for various soil types. It should be noted that these allowable loads vary considerably. Ground anchors should be designed by a competent person and installed in accordance with the manufacturer's guidelines and recommendations. Ground anchors can be difficult to install accurately. This can lead to eccentricities and give rise to bending moments in the structure or in



the foundations that need to be accounted for in the design.

Given the variability of the effectiveness of ground anchors in different soils, confidence in their capacity can be provided by testing, for instance by means of a fork lift truck with a calibrated load cell. Such testing should be in the direction of the force to be resisted by the ground anchor. A suitable factor of safety should be applied to the ultimate failure load using this method in order to determine the allowable tensile load.

9.3 SLOPING GROUND

In general, it is not recommended to built temporary structures such as roof systems on uneven grounds due to the fact that this can cause massive erection difficulties as well as instabilities in the structure during erection and/or dismantling. Where a site slopes or is uneven, it will be necessary to either make the ground flat or to erect a structure that is capable of being modified to deal with the unevenness.

Where the ground is not level or near level and the foundation bases for the structure cannot be set at an angle, a level base should be provided. This may be done either by cutting steps into the ground or by laying timber sleepers up the slope with timber blocks, shaped to match the slope and fixed to the sleepers to form individual foundations for each upright. It should be noted that the bearing capacity of foundations on a step is reduced proportionate to the slope of the surrounding ground. This reduction should be accommodated in design. A competent person should furthermore check the stability of the sloping ground.

Care must be taken to obtain full and even contact with the ground. Depressions should be filled and loose material compacted. If the ground is uneven and significant packing is used, care should be taken to maintained stability. Where a site slopes, or to raise a viewing platform, scaffolding substructures to support the main structure are often provided. The requirements for spreaders and/or grillages etc. described previously are equally relevant to the substructure; however, the interface between it and the main structure above should be considered. It is essential that the designs of the two elements are fully coordinated so that the correct load paths (vertical down loads, uplifts and lateral loads) can be maintained and the necessary connections made. It is important that a single competent person has overall responsibility for coordinating the various designs.

10. WIND CONDITIONS

The influence of wind on a temporary demountable structure is one of the greatest dangers. Therefore, it is of primary importance that all measures mentioned in the static report are applied. The non-skilled omission of ballast, guy-wires or other construction parts can have major consequences for the security of all people concerned. The need to implement all requisite measures is something that must be recognized by all parties concerned. Wind conditions can vary depending on the location where the temporary demountable structure is built. When using a temporary demountable structure, consulting local bulletins and/or applicable websites on a daily basis and taking precautions if necessary is therefore recommended.

Depending on their height, structures are calculated using different numbers for wind pressure. Building the same structure on top of a building or at ground level could have massively different implications.

It is permissible to reduce wind loadings on temporary demountable structures if canopies and scrims can be taken out within a certain time frame; 10 to 15 minutes seems to be adequate. In general, these precautions are taken from winds speeds above 20m/s / 74 km/h / 46mph.

10.1 USE OF SCRIM

The use of permeable scrim for every outdoor structure needs special attention. Quite often, permeability is expressed in a percentage related to light transmission. It should be noted that this is not the same thing as wind permeability. Scrim should be supplied with a cuff number for permeability. The type of fabric, its structure and the size of the openings determine this factor. In practice this implies that scrim may look open but is not with regard to wind.

Special acoustic scrims are available for sound wings. Most 'standard' scrims deform sound dramatically as they let the wind pass through. Wind speed should be measured at a height of 10m above ground level, or at least at the highest point of the structure.

WIND SPEED SHOULD BE MEASURED AT A HEIGHT OF 10M. ABOVE GROUND LEVEL OR AT LEAST AT THE HIGHEST POINT OF THE STRUCTURE.

BEAUFORT SCALE							
WINDFORCE [BEAUFORT]	WIND SPEED [m/s ²]	wind speed km/h	Wind speed MPH	Wind pressure Q [kN/m ²]	description	specification on land	
0	0-0.2	0 - 0,7	0 - 0,43	≈ 0	Calm	Smoke rises vertically	
1	0.3-1.5	0,8 - 5,4	0,5 - 3,36	≤ 0.001	Very light	Direction of wind shown by smoke drift but not by wind vanes	
2	1.6-3.3	5,5 - 11,8	3,37 - 7,33	≤ 0.007	Light Breeze	Wind felt on face, leaves rustle, ordinary wind vane moved by wind	
3	3.4-5.4	11,9 - 19,4	7,34 - 12,05	≤ 0.02	Gentle Breeze	Leaves and small twigs in constant motion, wind extends light flag	
4	5.5-7.9	19,5 - 28,4	12,06 - 17,65	≤ 0.04	Moderate breeze	Wind raises dust and loose paper, small branches move	
5	8.0-10.7	28,5 - 38,5	17,66 - 23,92	≤ 0.07	Fresh breeze	Small trees in leaf start to sway	
6	10.8-13.8	28,6 - 49,7	23,93 - 30,88	≤ 0.12	Strong breeze	Large branches in motion, telegraph wires whistle	
7	13.9-17.1	49,8 - 61,6	30,89 - 38,28	≤ 0.18	Near gale	Whole trees in motion, inconvenient to walk against wind	
8	17.2-20.7	61,7 - 74,5	38,29 - 46,29	≤ 0.27	Gale	Twigs break from trees, difficult to walk	
9	20.8-24.4	74,6 - 87,8	46,30 - 54,56	≤ 0.37	Strong gale	Slight structural damage occurs, chimney pots and slates removed	
10	24.5-28.4	87,9 - 102,0	54,57 - 63,38	≤ 0.50	Storm	Trees uprooted, considerable structural damage	
	28.3			0.50			
11	28.5-32.6	102,1 - 117,4	63,39 - 72,95	≤ 0.67	Violent storm	Widespread damage	
	35.8			0.80			
12	32.7-36.9	117,5 - 132,8	72,96 - 82,52	≤ 0.85	Hurricane	Widespread damage	
≈13	42.0	151,2	94	1.10			
≈14	45.6	164,16	102	1.30			
$V [m/s^2] = v[km/h] / 3.6$				$q[kN/m^2] = V^2 / 1600$			
Wind speed				Wind pressure			



11. ERECTION, INSPECTION AND DISMANTLING

11.1 PLANNING

The critical setup stages for temporary demountable structures should be identified during the design process. To ensure adequate provisions against overturning during erection, temporary strutting and/or guying may be necessary; such requirements should be adequately communicated to the site operatives.

The designer should specify the tolerances of assembly. Particular care should be taken to minimize eccentricities at structural joints. Diagonal bracing is often a problem in this respect.

11.2 WORK ON SITE ERECTION OF STRUCTURE

The structure should be erected safely in accordance with the manuals and drawings provided.

All Kent ledges, temporary guying and other means of temporary support identified in the manual should be properly installed to provide for the safety of operatives. All work at height must be fully assessed and carried out in compliance with the local or international requirements. Care should be taken to use the correct component in the correct location and orientation. All components should be carefully aligned. They should not be bent, distorted or otherwise altered to force a fit. Particular attention should be paid to lightness of connections. The torque applied to bolts and other connectors should be in accordance with the manufacturer's recommendations. Care should be taken to ensure that all ties and bracings specified have been correctly installed. Site alterations or adaptations to the specified design should not be made without the designer's verification.

SUBSTRUCTURES

11.3 BRACINGS AND CONNECTIONS

All necessary bracings and other components should be incorporated as assembly progresses. Bracing should be arranged to provide stability at all stages of erection. A check should be carried out to ensure that the necessary connections are made and that linking components are not strained to achieve engagement. Local instability that might endanger the complete structure when loading occurs could arise through omitting or failing to tighten a bolt. Constant emphasis should be placed on the importance of paying attention to detail.

11.4 SAFETY OF OPERATIVES

Following the guidelines for the safety of operatives involved in construction work is recommended. PPE, including fall arrest equipment, should be used where appropriate. Suitable anchorage points should be identified in the design.

11.5 INSPECTION OF STRUCTURES

Inspection is essential to maintaining the safety and integrity of a demountable structure. Inspections are required at various stages and are mainly the responsibility of the contractor. The client, safety coordinator and local authority may also make inspections. The contractor should make regular inspections during setup to verify the design assumptions and to check that work is being carried out in accordance with the documentation provided. The initial inspection should concentrate on setting out and site preparation. Subsequent inspections should check the orientation and location of the components, especially bracing members, the use of temporary supports and the proper installation of the correct connectors, couplers and fittings.

All inspection work should be documented. Specific reference should be made to remedial measures identified as being necessary and to dates agreed for carrying out such work. The contractor should carry out any remedial work deemed necessary by these inspections, unless he can provide documentary evidence to show that the as-built situation is safe.

11.6 LOCAL AUTHORITY

Where a local authority license is required, the local authority inspector should be provided with a full set of documents for the assembly of the temporary structure and may inspect it at any stage. Such inspection will pay particular attention to site preparation and the fully assembled structure. The inspector may also require copies of any formal documentation of previous inspections.

11.7 SETUP CHECK

After setup, the structure should be subject to an erection check by a competent person. The inspection should be followed by a systematic local check of the complete structure. A drawing and checklist should be available for continuous reference. The inspection should check that:

- Setting out is accurate within the tolerance required.
- The foundations are adequate, that they are not likely to be disturbed and that they and the lower portion of the supporting structure are not liable to damage by interference, accident, traffic, scour, undermining or any other cause.
- Suitable base plates/spreaders have been provided, properly levelled and, where necessary, adequately supported. The base plates/spreaders have been properly bedded down, with no unacceptable settlement.
- Members are correctly positioned and connected.
- The stipulated limits of extension of adjustable components have not been exceeded.

- All required components, including pins, bolts, nuts, clips etc., are of the correct type, have been correctly inserted and are secure.
- Decking, seating and guardrails have been correctly installed and are secure.
- Services to the structure do not in themselves create a hazard or impose loadings not catered for in the design.
- Where a contractor employs scaffold tubes and fittings within a structure, an agreement is in place between the contractor and the client regarding the extent of the random check to be made on the scaffold fittings. The number of fittings to be tested, the test requirements, the written record to be made and the percentage allowed to fail should all be agreed, and any fittings that fail should be replaced.

The inspection should check that the actual erection conforms to the design documents supplied by the contractor. Any deviations should be substantiated and supported by additional documentary evidence. The results of the inspection should be recorded in writing and action taken to correct any faults. On completion of a satisfactory inspection, the client should be informed and confirmation made in writing. After the structure is completed and inspected, it should be secured to prevent vandalism. Measures should be taken to prevent unauthorized access beneath the temporary structure. It is recommended that a competent person inspect each structure while it is in use, with the frequency of inspections depending on the nature of the event. If a structure remains in use for a longer period of time (e.g. for a series of concerts at a festival), it should be inspected before each use.

11.8 DISMANTLING

The process of dismantling a demountable structure is important since its components are likely to be reused. Care should be taken to maintain the safety of the dismantling team and other people nearby. The critical erection stages should have been identified during design. Normally, the safest dismantling plan reverses the erection procedure. Any temporary guying used to erect the structure will therefore be required when dismantling. This should prevent components from being bent, distorted or overstressed during dismantling. Minor damage to the structure may have occurred whilst in service, and damaged components should have been clearly marked in advance for ease of identification when dismantling. During dismantling, the contractor should examine all components for signs of wear, deformation or other damage. Damaged components, or those with temporary repairs, should be set aside for rejection or permanent repair offsite.

11.9 INSPECTION OF COMPONENTS

Repeated use of demountable structures will inevitably lead to general wear and tear on top of the damage or distortion that may occur during handling, transportation, assembly and dismantling. The contractor should regularly inspect all components used in demountable structures – including both erection aids and components of the structure itself – for signs of wear, deformation or other damage. Such inspections should be carried out at the following stages:

- When allocated at the stockyard
- On arrival onsite or during unloading
- During assembly
- Whilst in service
- During dismantling
- On arrival back at the stockyard

Since components may be reused many times, particular attention should be paid to identifying damaged or corroded components; any components whose structural efficiency has been or could be impaired should be rejected. Damage or deterioration may be corrected if practicable, but if repair is not practical or economic, the component should be replaced. Damaged or defective components should be clearly marked and removed from the site as soon as possible. Spare components should be readily available to allow necessary repairs to be undertaken rapidly. Temporary repairs using makeshift components should be avoided. Typical damage can include:

- Tube and prefabricated components: corrosion, cracking, deformation, creasing, split ends, non-flat or non-square ends, weld integrity.
- Connectors, couplers, fittings: deformation, distortion, damaged threads.

Please refer to specific rejection criteria for components supplied by the manufactures of those components.

12. IDENTIFICATION

12.1 STRUCTURE COMPONENTS

All Prolyte trusses, towers and components are individually marked and can be identified by a type shield. Make sure these stickers are on the product. Overview drawings show where each component goes in the built construction.

12.2 CANOPIES

Prolyte canopies are generally made from fire retardant PVC. Identification marks are stamped in the material and printed on the label. Certificates for different countries are available upon request.



12.3 BALLAST

Ballast is the additional weight that is necessary to keep the structure in place and to secure it against wind forces, wind gusts, sliding or other hazards.

The required weight can be different for each tower. For a list of the total amount of ballast needed, see the structural report.

In view of the various methods for applying ballast, as well as local legal restrictions, specific weight types are not shown in the drawings. However, ballast weight on tower bases is essential to ensuring the stability and safety of the system, and particularly in limiting climatic (wind!) conditions. It is the stage manager responsibility to ensure that the correct weight is applied to the ballast points.

The weight of an intermediate, interconnected construction or stage can be deducted from the total required ballast loading, provided the stage is capable of bearing the horizontal forces, as specified in the structural report. The stage must furthermore function as a single solid platform – meaning that the entire stage should come up when it is lifted at any corner. These requirements need to be checked by the stage supplier.

13. ASSEMBLY

13.1 GENERAL INFORMATION

WARNING:

If not mandatory in local legislation on personal safety it is strongly advised to wear fall protection-equipment when sitting or climbing on the ridge bar, as this– in the larger MPT-Roof sizes is well over 2m above ground or stage level.

13.2 CANOPY

Over-tensioning should be avoided as this reduces the lifespan of the canopy dramatically and can result in excessive stresses in the main grid trusses.

Note: When dismantling the roof, fold the canopy from the side to the middle, with the outside to the inside. This is advantageous for the next building sequence.

13.3 LIFTING

The structural integrity of a temporary demountable structure is only guaranteed when completely built, meaning when all guy wires are in place and the ballast is connected. Integrity is not the same during lifting and lowering! It is important to keep this in mind at all times. In general, Prolyte structures can be lifted and lowered at a maximum wind speed of 7.9 m/s (28.4 km/h / 17.6 mph).

When lifting the structure, one person should always be in charge of the lifting operation and one employee should monitor the lifting at each lifting point. Make sure there is good visibility at all times.

Also ensure that the capacity of your lifting device is adequate. We advise having at least 25% headroom in capacity. Unequal lifting, friction caused by sleeve blocks and uneven weight distribution can result in loads that are higher than foreseen.

13.4 USE OF WINCHES / HOIST

Make sure to guide the wire-ropes of the winch into neat side-by-side turns in smooth layers on the drum, as crossing cable turns cause severe damage and wear. The wire can easily be guided by hand, but keep hands at a safe distance from the drum to prevent getting caught, and wear protective gloves at all times. Damage to wire ropes can lead to the breaking of wires, wire strands or even the whole cable, thus causing the sleeve block to fall, with a risk of property damage, personal injuries or even death. When using a chain hoist, make sure that chains are free from twists at all times.

WARNING

Neglecting the addition of the appropriate amount of ballast and/or leaving (part of) the guy-wires out can be dangerous and may, under influence of strong winds, result in failure of the complete structure.

For the required ballast see appendix 2

14. LEGISLATION

Prolyte products are made in compliance to the following standards:

Manufacturing

DIN 4113 all parts	Aluminium construction under predominatly static loading
DIN 4112	Temporary structures; standard for design and construction
DIN 1055 all parts	Design loads for buildings, store materials, building materials an structural members
EN 13782	Fairground and amusementpark machinery and structures-safety-tents safety
EN 13814	Fairground and amusementpark machinery and structures-safety
BS 7905-2	Specification for design and manufacture of alumniun and steel trusses and towers
CWA 25-A	Lifting and Load-bearing Equipment for Stages and other Production Areas within the Entertainment Industry. Part A Specification for design and manufacture of aluminium and steel trusses and towers
EN 10002-1	Metallic materials – Tensile testing – Part 1: Method of testing at ambient temperature
EN 10056-1	Specification for structural steel equal and unequal angles - Dimensions.
EN 10067:1997	Hot rolled bulb flats, Dimensions and tolerances on shape, dimensions and mass
EN 10204:2004	Metallic products - Types of inspection documents
EN 10210-2:1997	Hot finishes structural hollow sections of non-alloy and fine grain structural steels, tolerances, dimensions sectional properties
EN 515:1993	Aluminium and aluminium alloys - Wrought products - Temper designations
EN 573 (all parts)	Aluminium and aluminium alloys - Chemical composition and form of wrought products
EN 754 (all parts)	Aluminium and aluminium alloys Cold drawn rod/bar and tube
EN 755 (all parts)	Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles
EN ISO 3834-all parts	Quality requirements for welding - Fusion welding of metallic materials –
ISO 15614-2	Specification and approval of welding procedures for metallic materials – Part 2: Welding procedure tests for the arc welding of aluminium and its alloys
ISO 9606-2	Approval testing of welders - Fusion welding - Part 2: Aluminium and aluminium alloys
ISO 15614-1	Specification and approval of welding procedures for metallic materials - Part 1: Welding procedure tests for the arc welding of steels
EN 30042:1994	Arc welded joints in aluminium and its weldable alloys - Guidance on quality levels for imperfections.

Use

BS 7906-2	Code of practice for use of aluminium and steel trusses and towers
CWA 25-/B	Lifting and Load-bearing Equipment for Stages and other Production Areas within the Entertainment Industry. Part B Specification for use of aluminium and steel trusses and towers

Informative documents

VPLT SR1.0	code of practice for the use of aluminium trusses and truss structures (Germany)
NPR 8020-10	Entertainment-rigging-design factors of safety (Netherlands)
TISE	The institution of Structural Engineers, Temporary Demountable structures, guidance on use, procurement and design (England)



15. INSPECTION

15.1 GENERAL

Prolyte encourages the performance of carefully documented inspections by a competent person at least once a year, and more often if the circumstances or intensity of use require this.

Responsibility and liability for the safe use of all temporary demountable structures lies predominantly with the client itself!

WARNING

All parts have to be checked and inspected visually for damage or any other aspect that might negatively affect the safety of the truss, prior to each time of use.

15.1.1 INSPECTION CRITERIA

The open heel in the bracing welds in the 30'er and 40'er series is normal and accepted in the TÜV approval. 10% deformation on diameter, wear, tear, miss-alignment is accepted.

15.2 INSPECTION LEVELS

15.2.1 INITIAL INSPECTIONS

When first acquired, either new or used, truss modules should be inspected, in accordance with Table 1 on page 18 and a record of the inspection maintained.

15.2.2 REGULAR INSPECTIONS

Regular visual inspections should be carried out in accordance with Table 1 on page 18. Regular inspections should be performed by a competent person and should be carried out prior to each use

15.2.3 PERIODIC INSPECTIONS

Periodic visual inspections should be carried out in accordance with Table 1 on page 18 and a record of the inspections maintained. Periodic inspections should be performed by a competent person and should be conducted at least once each year or in accordance with an inspection routine established by a qualified person.

Trusses subject to any accident shall be inspected according to the requirements as per periodic inspection and tabel 1 on page 18.

15.3 INSPECTION FREQUENCY

15.3.1 TRUSS IN REGULAR SERVICE

Truss modules in regular service should be subjected to regular and periodic inspections (see 1.1.2 and 1.1.3 on page 18).

15.3.2 PERMANENT INSTALLATIONS, STATIONARY

Periodic inspections should be carried out on all truss modules that are permanently installed in a stationary (not moved) configuration. The frequency of inspections should be determined based on the prevalent conditions.

15.3.3 PERMANENT INSTALLATIONS, MOVING

Periodic inspections should be carried out every three months, or in accordance with an inspection routine established by a qualified person, on all truss modules that are installed in a permanent configuration where movement of the truss system is an integral part of use.

15.4 RECORDS

The owner should keep records of initial inspections and periodic inspections of each truss module, which should be signed and dated by the inspector.

15.5 REPAIRS AND REMOVAL FROM SERVICE

If any part of a truss shows significant visible damage or is suspected to contain a damaged element (visible or not), the truss should be removed from service and marked accordingly. A qualified person should carry out an assessment of the truss. Any module that contains damage deemed irreparable should be permanently removed from use. Repairs should be carried out and warranted by either the manufacturer or a qualified person.

15.6 STEEL WIRES AND CHAINS

Inspection criteria and maintenance instructions for hoists, winches and all other rigging equipment are provided in the relevant manuals.

WARNING

Neglect of maintenance and/or inspection at regular intervals of the truss, might eventually lead to the use of unsafe products, resulting in risk of property damage, personal injury or even death.

TABLE 1

Part	Inspection level			Items to be inspected						
	Initial	Regular	Periodic	Chords	Diagonals	Connectors	Welds	Fasteners	Geometry	ID-TAG
	Chapter 15.2.1	Chapter 15.2.2	Chapter 15.2.3							
Missing parts										√
Dents	√	√	√	√	√					
Bends	√	√	√	√	√					
Holes (1)	√	√	√	√	√	√	√	√		
Incorrect repair	√	√	√	√	√	√	√	√		
Abrasion	√	√	√	√	√		√			
Corrosion			√		√		√			
Missing members	√	√	√	√	√	√		√		
Flatness (2)	√	√	√			√				
Deformation	√	√	√			√		√		
Excessive wear	√	√	√			√	√	√		
Cracks	√	√	√				√			
Correct grading (3)	√	√	√					√		
Twisting	√	√	√						√	
Squareness	√	√	√						√	
Bending	√	√	√						√	
Sweep			√						√	
Camber			√						√	
(1) not to be part of the construction (2) particular for trusses with connecting plates (3) Minimum 8.8 grade										