Technical Textiles

Maintenance and Cleaning Manual

Inspection and Maintenance Manual for Tensile Architecture

General instruction
for the safe inspection
and maintenance
of tensile structures

The information issued within this manual
is intended to act as a guideline
for cleaning and maintenance tasks
according to our actual knowledge
as per September 2008,
and is without legal commitment of any kind
and is not a substitute for the warranty certificate guidelines.

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Content:

1. Introduction

The Mehler Texnologies PVC-Polyester membrane material is abrasion and weather resistant and should provide many years of trouble free service life if properly engineered, accurately manufactured and safely installed. The fabric however, can be cut or torn, and damaged by a sharp impact; it can be crushed if subjected to high localised 'pinching' loads, damaged by bad design or by inappropriate clamping devices, and moreover by carrying out unsafe installation. Care must therefore be taken in handling the material at all process stages, and whilst walking on it, in order to protect against accidental damage.

On structures of this type, the membrane is a structural part of the roof system, and not just a protective cover. It is mechanically pre-tensioned to provide a stable roof system capable of withstanding the design conditions of wind, sand, weather, etc. However, if damaged, redistribution of load can result in a concentration of stress that could cause a propagation of tears. Minor problems can become major if neglected. In order to assure proper service life, it is essential that good operation and maintenance practices are adopted and strictly adhered to.
A continuing awareness of the condition of the membrane is essential. Throughout the life of the structure there shall be visual inspections conducted to spot any obvious damage or deficiencies. If any are found they shall be further investigated and action taken to repair or correct as deemed necessary. Emergency repairs to the membrane material shall be carried out by persons experienced in this area.

1.1 Cleaning instruction

No solvents or strong alkaline cleaners shall be used. Following previous experiences and extensive testing results we recommend, fo **VALMEX**® **structure** membranes **UNGAPON**®, a detergent from Max Bail, Chemisch-Technische Produkte.

Rinse off the soil on the surface with cold or warm water.

Apply the amount of cleaner required for the type of soiling, following the recommended concentration laid down by the manufacturer of the cleaner.

Spray it on or wipe it on to the material with a cloth. Leave the cleaner to work for up to 5 minutes and wipe it off with a cloth.

Rinse off the dirt and cleaner with pure cold or warm water. Then dry off thoroughly with a dry cloth.

Do not dry with hot air or overheat the surface it could lead to change of colour.

Please read recommendations of supplier attentively.

The fabric must be stored under clean and absolute dry conditions.

Recommended supplier of detergent:

Max Bail
Chemisch-Technische Produkte
Alpenstrasse 22
D-87751 Heimertingen
Germany
Phone +49 (0) 83 35 989-660
Fax +49 (0) 83 35 989-6699
www.max-bail.de
service@max-bail.de

If in doubt about a particular cleaning solution, please do not hesitate to contact us for our recommendation. Mehler Texnologies GmbH is prepared to carry out tests on the proposed detergents and check their recommendations.

2. Inspection Plan

2.1 Purpose and Scope

The purpose and scope of an Inspection Programme is to detect and report minor deterioration or damage before it becomes a major problem, and to ensure that any minor damage is promptly repaired.
In some particular climatic conditions, condensation on the underside of the fabric may be a problem as this can occur especially in the case of roofs above a heated space, or in case of double skin covers. Therefore, in addition to the materials own inbuilt protective additives, and an appropriate design solution for ventilation, it is of high importance that the project owner considers regular inspection of the structure, in cooperation with the roof specialist. Older exposed roof surfaces, especially when not maintained, are more at risk to fungal accumulation and consequently to poor aesthetics, and in extreme cases physical deterioration of the material properties may occur.

Tensile structures made from Mehler Texnologies materials have proven their outstanding resistance under different load and weather conditions and are highly resistant to impact damage (much more then glass and many other building materials). Nevertheless, their resistance can be reduced by impacts to sharp objects.
With PVC-PES materials, small cuts can be repaired by specialists with portable hot air welders applying patches directly on the damaged area. In case of large damage, and resultant replacement of an entire panel if this is required, then the membrane may need to be removed and a replacement panel inserted in the factory.

2.2 Inspections required

2.2.1 General Inspections

A continuing awareness of the mechanical, as well as the physical condition, of the membrane is essential. Throughout the life of the structure there shall be visual inspect-ions conducted to spot any obvious damage or deficiencies. If any are found they shall be further investigated and action taken to repair or correct as deemed necessary. A record of these general inspections shall be kept for each individual roof area. Deficiencies shall be recorded on an Inspection Report Summary Sheet, noting the damage or deficiencies found and the action taken.

2.2.2 Half Yearly Membrane Inspections

The Half Yearly Membrane Inspection shall be carried out by the Owner's maintenance staff (if familiar with working at height in a safe mode), as this type of inspection does not require a fabric membrane specialist.
This inspection which is performed every 6 months is to detect minor damage in the membrane before it develops into a major problem.
It checks for:

1. Small cuts or openings in the fabric by observing the material against a bright light (sky, artificial light, etc.).
2. Any distortion of the shape (wrinkes, etc.) indicating the possibility of damaged material, released clamp profiles, cables or tensioning devices.
3. Any change in colour, changes in the surface sealer (acrylic lacquer, PVDF)

A record of this inspection shall be made for each individual roof area. Deficiencies shall be recorded and photographed. A copy of this record shall be sent to the membrane specialist. If immediate action appears to be required, the specialist shall be informed.

2.2.3 Routine Annual Membrane and accessories inspection

This inspection shall be carried out annually by suitable specialists. It is recommended that this inspection be scheduled to occur in late summer to ensure that all components of the structure are in acceptable condition prior to the autumn and winter months when the incidence of storms are most likely.
It will be necessary to inspect the roof by walking along and across the membrane, safely using latch-way safe systems or appropriate abseiling systems. At the same time the cables, clamp plates / tracks, tensioning devices and closure flaps shall be checked for structural integrity and water permeability. The attachments will also be checked for any condition that could damage the membrane.
The inspection shall include:

1. Clamping elements along the perimeter of each membrane panel. The inspector will ensure that the fabric is securely and properly held by the clamps without stress concentration.
2. Checking for debris or abrasive particles lodged along the edge of the membrane.
3. Checking selected welded joints for integrity.
4. An inspection of the surface of the membrane for evidence of scratches, abrasions, or fabric damage. Such damage will normally show up as dirt streaks where the dirt catches in the abraded surface.
5. Cables, for evidence of rusting, damage to the covering and broken strands.
6. Cable fittings and turnbuckles for evidence of rusting and firmness of bolts.

The objective of this inspection is twofold:

1. Checking for debris or abrasive particles lodged along the edge of the membrane.
2. To ensure that the routine preventative maintenance is being performed in a satisfactory manner.

2.2.4 Unscheduled Inspections

These inspections are not part of the normal inspection and maintenance routine. However, when the membrane has been subjected to any severe weather or other potentially damaging occurrence, a comprehensive inspection from inside, and from roof level should be carried out.
Any damage found should be recorded, photographed and reported immediately to the membrane specialist.

2.3 Inspection Report

The inspection report shall consist of the following items:

- A letter of transmittal
- A summary description of the inspection which will highlight any major or critical items needing special attention
- An inspection Report Summary Sheet
- A copy of the detailed inspection reports
- Other additional information to help document the report (i.e. photographs, sketches, etc.)
- A special repair report when a repair is encountered that is not covered by a standard repair procedure. This special repair report will detail the recommended repair procedure as well as the equipment and materials needed to perform the repair.
- Please consider always safety as paramount. Unsafe works will generate dangerous situation for your workers and for the membrane itself. Never act directly on tension devices, cables, clamps or rigging screws without consulting first the project documentation and contacting the membrane specialist.

3. Maintenance Programme

3.1 Purpose and Scope

The purpose and scope of this chapter is to outline the preventative maintenance required to preserve the life expectancy and continued integrity of the membrane and its associated structural elements.

3.2 Routine Preventative Maintenance and Repair Procedures

Routine preventative maintenance is conducted on a continual basis and is actioned by a diligent repair team that searches out and repairs minor damage on all parts of the structure according to the methods described in the repair method chapter (4.3).
Inspection reports will generate specific repair action and will be judgmental of the preventative maintenance programme.

3.2.1 Fabric Membrane

The PVC Polyester fabric requires relatively little routine maintenance unless damaged or dirtied by pollution.
Normal rainfall will usually be sufficient to eliminate excessive build up of dirt. Therefore follow the simple cleaning instruction as mentioned at the introduction of this manual on a regular basis, depending of your project needs. Think to safely access the site and provide environment friendly detergent water evacuation.
If immediate repair is necessary to prevent the tearing of the fabric, advice should be sought from the membrane specialist as to the best short term remedy. The project owner should nominate one of their own employees, to be trained by the membrane specialist to conduct small repairs (in order to assure immediate action and cost savings).

3.2.2 Cables and Fittings

On cables, fittings, turnbuckles, etc. corrosion or staining may occur. This can be removed by the careful use of a mild abrasive liquid cleaner. Care must be taken to avoid touching the membrane with this cleaner.

4. Personnel Requirements and Qualifications

4.1 Purpose and Scope

This section specifies the personnel required and their qualifications for implementing the inspection and preventative maintenance.

4.2 Inspections

Unscheduled and half-yearly inspections can be performed by one inspector who has a general knowledge of the membrane and is a keen, diligent and systematic observer. Filling out inspection forms and submitting a report is required of this individual. He should assist the membrane repair team as required. This inspector may be an employee of the owner after having received on-site training by the membrane specialist staff.
Routine annual inspections must be carried out by site engineers as well as experienced membrane specialists.

4.3 Emergency Membrane Repairs

Emergency repairs to the membrane can only be carried out by persons experienced in working with PVC Polyester Membranes.
The project Owner should keep enough original material in reserve for small repairs and replacements. PVC-PES membrane will normally be welded by use of High Frequency machine. Differently from other materials, PVC-PES can also be welded by hot-air welder machines directly on site, by following simple instruction issued by the membrane specialist. Time and welding temperature may vary depending on the material itself and the actual climatic condition. The surface to be welded shall be free of any obstacle and absolutely dry and clean. Depending on the damage, the patch shall cover at least 200% of the damaged surface, the welding shall be where possible executed on the complete patch surface.

4.4 Repairs to Damaged Metal Parts

Repairs of damaged metal surfaces can be undertaken by experienced fabricators, experienced in working with stainless steel and aluminium.

5. Safety

All persons associated with the inspection, maintenance and repair of the structure must follow safety standards, as indicated by the projects own safety plan.

5.1 Access to the Membrane Area

Access must only be made to the roof of the building through the proper routes, as designated by the owner.
After work is completed, all access doors, etc. must be locked to prevent unauthorised access.

5.2 Inspection and work tasks check points

- No walking on clamp plates or boundary cables.
- No work at height to be carried out unless wearing an approved safety harness, attached to a suitable strong point.
- Use only clean shoes with soft, non-slip, white soles.
- Avoid support ladder and other devices directly in contact with or on the membrane material.
- Do not slide anything on the membrane surface.
- Prevent dropping objects on the membrane, like sharp working tools, scissors, screwdrivers, etc.
- Use protective gloves, when welding on site and in general for any other working task.
- Do not inhale the welding gases directly; always use an appropriate protective mask.
- Do not heat over, or weld seams that are under tension in perpendicular direction.
- Use clean, high temperature resistant rollers and always clean the hot air welder adapter.
- Avoid burning or overheating the fabric coating.
- Test the water tightness of the welded seams by running a screwdriver along the seam, once cooled down.
- Never rest the hot air welder directly on the membrane surface.
- Use insulated electric cables free of damages.
- Avoid such repairs when the membrane surfaces are wet from rain or condensation moisture.
- Take care of the weather conditions: the installation, repairing and in general maintenance works on tensile systems requires reasonably calm weather conditions. The light weight of the fabric materials, coupled with the large areas of exposure, means that work can only be executed at wind speeds of less than 5 m/s. The risk becomes higher if the surface is wet and this can additionally increase the risk of accident and poor repair works.
- At higher wind speeds certain climbing and lifting operations must be suspended. Installation should be stopped at temperatures below 10° Celsius.
- Always think about: working at heights is a high-risk activity.

The responsible way in which Mehler Texnologies deals with energy and resources, its use of environmentally sustainable materials and its activities related to the recycling of coated textiles have now been bundled under one all-embracing label.

MEHLER eco-care