



AVANTI 防坠落系统  
**AVANTI FALL PROTECTION SYSTEM**

用户手册和安装说明  
**User's Manual and Installation Instructions**

# AVANTI 防坠落系统

用户手册和安装说明

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FORCE-Dantest CERT



## EEC type examination certificate for personal protective equipment

**Number: DK-0200- C.1553**

Issued by FORCE-Dantest CERT  
EEC-notified body number 0200

In accordance with the Directorate of National Labour Inspection's Regulation No. 1273 of December 18th 1996, which in Denmark implements The Councils directive No. 89/686, No. 93/68, No. 93/95 and No. 96/58, EEC type examination certificate is issued to:

**AVANTI Stigefabrik A/S**  
**Høgevej 19**  
**DK-3400 Hillerød**

for protective equipment:

**Guided type fall arrester**

type:

**A system consisting of a guided type fall arrester, a textile damper, a safety hook and ladder sections mounted with slide bar - type 2002**

designated:

**Fall arrester type AVANTI Eagle System**  
**Textile damper type AFN 11**

manufactured by:

**AVANTI Stigefabrik A/S with sub-suppliers as stated in the appendix to the type examination certificate**

The examined samples are found to fulfil the requirements in DS/EN 353-1:2002 as well as the relevant requirements in Appendix II in Regulation No. 1273.

The type examined model and the basis for the type approval are described in the appendix to the type examination certificate. The manufacturer must inform FORCE-Dantest CERT of any contemplated changes.

This protective equipment is a category III equipment and therefore an agreement regarding control shall be arranged with a notified body according to the Regulation.

Date of issue: *2006-06-19*

Signature:

Bent Larsen  
Director

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Cert. Manager

FORCE-Dantest CERT  
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DK-2605 Brøndby  
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## 1 警告

- a) 一个专家需熟悉防坠落系统，熟悉 EN 363 和 EN 353-1，并接受过这些方面的培训。

AVANTI 防坠落技术人员已经成功地参加了 AVANTI 防坠落课程培训，被认为是专家。

一个胜任的人员应熟悉 AVANTI 防坠落系统的正确使用，并对个人的防护设备有初略的了解。

- b) 防坠落系统的组装、维护和测试只能由专家完成。胜任的人员才可以使用该系统。
- c) 用户必须阅读和了解该用户手册。
- d) 用户手册必须分发给防坠落用户，在需要时必须方便查询。
- e) 如果以上其中一个任务委托给多个人，雇主应该委任一个检查员监督操作。
- f) 如果防坠落系统被转售到最初的目的地国家之外，转售商应该用产品使用国的语言提供使用说明、维护说明、周期检查说明和修理说明。
- g) 请确保安装有防坠落系统的梯子系统能支持：  
美国：不少于 5000 磅（22.2kN）静态负载；  
加拿大：不少于 27kN  
欧洲：15kN

## 2 危险

- a) 禁止在酒精或麻醉药物影响下的人员使用防坠落系统，否则可能危害工作安全。
- b) 仅通过专家介绍而了解防坠落系统的人员才可使用该系统。
- c) 业主必须确保工作期间发生的任何紧急情况的救助计划处于适当的位置，而且用户熟悉救助计划。
- d) 如果在操作期间发现任何危险或故障，或者危害安全的紧急情况出现：
- 立即停止当前的工作。
  - 联系现场负责人，如风机业主或现场的工头。
- e) 不能保证由于设备的重装或修改，或者使用没有经过制造商认可的零件而产生的损害。
- f) 防坠落系统不可用于适用范围之外，或者用于除了适用范围以外的任何其他目的。
- g) 应分发 AVANTI 防坠落滑行装置，以作为个人防护设备。
- h) 在向上和向下爬梯期间，用户之间须保持 6 米的距离。多个用户不可同时使用 2×6 米导轨，因为将危害系统静力学平衡。
- i) 前两米不能保护用户免于撞击地面。要小心注意。
- j) 首次使用前，专家必须检查系统。

- k) 如果油、润滑油或者类似物泄露在安全导轨上-则擦干净导轨。
- l) 如果油、润滑油、化学物品或者类似物泄露到减震器上，或者减震器和带状织物相接触，则请 AVANTI 防坠落技术人员替换减震器。
- m) 在使用 5 年之后替换减震器。截止日期印刷在减震器的标签上。
- n) 操作温度  $-35^{\circ} / +60^{\circ}$  摄氏度。
- o) 只有符合 EN 361 的全身安全带才可使用与防坠落系统连接。
- p) 完整的防坠落系统根据 EN 353-1 制造并得到 EN 353-1 认可。
- q) AVANTI 供应的梯子符合 EN 131 和 EN ISO 14122 的要求。
- r) AVANTI 供应的 CE-标记安全锁扣是通过 EN 362 认证批准，AVANTI 减震器通过 EN 355 认证批准。
- s) 所有零件和部件特意为型式 2002AVANTI 防坠落系统开发，因此不能被用于其他防坠落系统。
- t) 这些说明必须和防坠落系统放在一起。

塔架业主必须验证地方当局对第三方防坠落设备检验的要求，确保符合特定的标准。

## 3 设备说明

### 3.1 目的

用户手册中的防坠落设备应用于下列情况：

- ★ 防坠落系统用于在固定的梯子上的上下攀爬，该
- ★ 梯子安装在塔楼、塔门、井道、检修孔等。
- ★ 防坠落系统是一种阻止坠落的安全设备，如果坠
- ★ 落发生时减少人身伤害。
- ★ 防坠落安全导轨为某一地方永久安装而设计

防坠落设备不为以下目的而设计：

- ★ 水平保护
- ★ 保护设备

### 3.2 功能

坠落防护设备由安装在梯子上的安全导轨和卡在导轨上的滑行装置组成。用户借助减震器和安全锁扣将滑行装置系在用户的安全带上。当开始爬梯时，他/她将滑行装置卡在安全导轨上。当爬梯时，滑行装置在安全导轨上向上滑行。万一用户坠落，滑行装置将锁在安全导轨上以阻止坠落。

### 3.3 部件概览



梯子上的导轨和滑行装置

## 4 日检

- 1) 使用前，检查滑行装置是否有损坏、磨损和撕裂、以及其他缺陷。要特别注意减震器。
- 2) 向上爬梯期间，察看可见的损坏、松动的零件以及梯子、导轨或接合处松动的螺栓。
- 3) 有缺陷的装置或留有安全疑问的装置必须由专家检查。



如果滑行装置看起来有缺陷，或零件丢失，则停止使用。

## 5 使用说明



### 危险！

- 滑行装置、减震器和安全锁扣组成了安全系统。不要改装、扩展、或以任何方式改变这一系统。
- 如果左边底部的钢质旋塞锁在锁定位置突出，才可使用滑行装置。
- 滑行装置的箭头必须指向上方-否则它将不能阻断坠落。

8

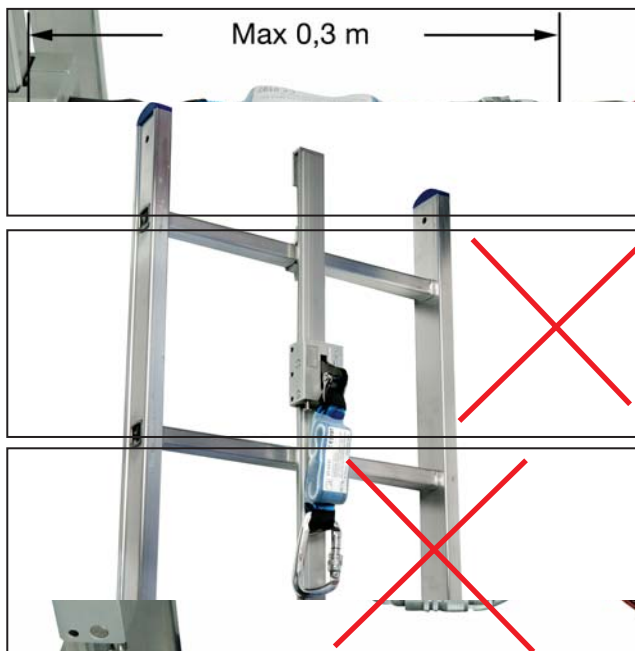


滑行装置



Eagle 滑行装置





## 说明

- 使用防坠落系统之前，确保用户根据制造商的规定穿上了认可的安全带。
- 将安全锁扣固定在胸部或腰部 D-锁环的安全带上。
- 箭头指向上方，将滑行装置啮合在安全导轨上。  
(见下图)

1



按下左边底部的钢质旋塞锁打开滑行装置，将滑行装置的左右边拉开。

将滑行装置的箭头指向上方，将滑行装置的左右边放入各自对应的安全导轨左右边(1)。

2



提起制动杆，使滑行装置倾斜，因此滑行装置的两边围住了安全导轨的每一边(2)。

3



将滑行装置的两部分压在一起，使左边底部的钢质旋塞锁弹回到原来的位置，锁住滑行装置。确保滑行装置被正确锁住(3)。

按下左边底部的钢质旋塞，拉开滑行装置的两部分，取出滑行装置。

拆卸滑行装置之前确信阁下是安全的，或者使用另一防坠落系统。



**危险！**

如果防坠落设备阻断了一个坠落，则将该梯子废弃。  
与防坠落技术人员联系，替换受损的梯子/导轨。

## 5.1 AVANTI Eagle 使用说明

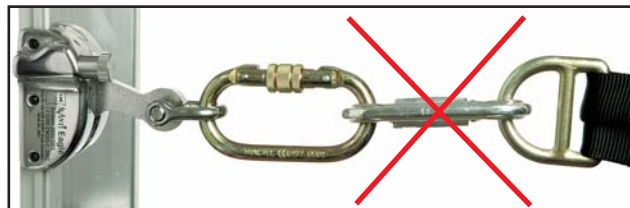
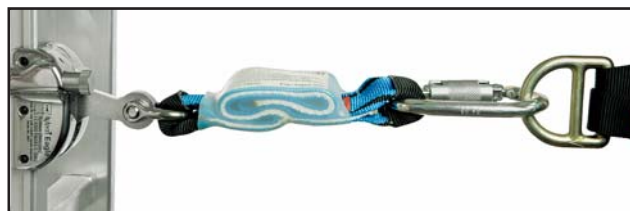


**危险！**

- 滑行装置、减震器和安全锁扣组成了安全系统。不要改装、扩展、或以任何方式改变这一系统。
- 滑行装置的箭头必须指向上方-否则它将不能阻断坠落。
- 如果滑行装置看上去有缺陷或者零件丢失，则停止使用。

### AVANTI Eagle 说明

- a) 使用防坠落系统之前，确保用户根据制造商的规定穿上了认可的安全带。
- b) 将安全锁扣固定在胸部或腰部 D-形环的安全带上。



### 打开 AVANTI Eagle

打开 AVANTI Eagle 必须在没有负载的条件下进行，并需确保没有坠落危险。

- 1) 顺时针旋转翼形螺丝，直到它完全嵌入（照片 1A）。

1A



- 2) 首先按下锁紧棘爪，然后使制动杆向上-在箭头的方向-使他们保持在适当位置（图 1B 和 1BB）。

1B



1BB



- 3) 在右侧相对于导轨以合适的角度打开 Eagle 滑行装置（照片 1C）。

1C



## 安装 Eagle 滑行装置

- 1) 向上旋转主体上的标杆。
- 2) 安装在导轨之前 Eagle 滑行装置务必打开。
- 3) 随着制动杆抬起，将 Eagle 滑行装置按在导轨周围。
- 4) 将滑动装置按在一起时，释放制动杆。锁紧棘爪跳回压住制动杆，将制动杆锁紧（照片 2B）。

2A



2B



12

2D



- 5) 逆时针旋紧翼形螺丝（照片 2D）。
- 6) 翼形螺丝在使用期间务必完全拧紧。
- 7) 使用前无负载时测试 Eagle 滑行装置。向上提升闭合的滑行装置，然后向下拉-那么滑行装置应该锁紧。

#### Eagle 滑行装置使用期间

- 当 Eagle 滑行装置在使用时，为了不能提起锁紧棘爪，指旋螺丝务必完全拧出到终点挡板。
- 务必使用没有损坏且正确安装的滑行装置和导轨。

## 6 维护

- a) 用布料擦干滑行装置和导轨。
- b) 保持所有的零件无油、无润滑油和化学物品。
- c) 在防坠落系统附近不要放置液体或尖锐物体，因为这些物体可能损坏设备。

- d) 使用弱酸溶液和软毛刷清洗安全带。随后用清水漂洗。
- e) 如果设备是湿的，则自然晾干。不要使用任何加热措施。
- f) 滑行装置贮藏时要避免阳光暴晒，避热和灰尘。

至少每 12 个月由 AVANTI 防坠落专家做一次检查。

## 7 年检

每年专家必须对防坠落系统做一次检查，要特别检查安全导轨和滑行装置。如果没有年检，将使保修承诺失效。

如果没有做年度测试，则保证失效，AVANTI 将不承担所有责任和索赔要求。

AVANTI 定期开办“防坠落技术员课程”。如果感兴趣，则联系 AVANTI。

## 8 订购备用零件

发现零件丢失时停止工作。

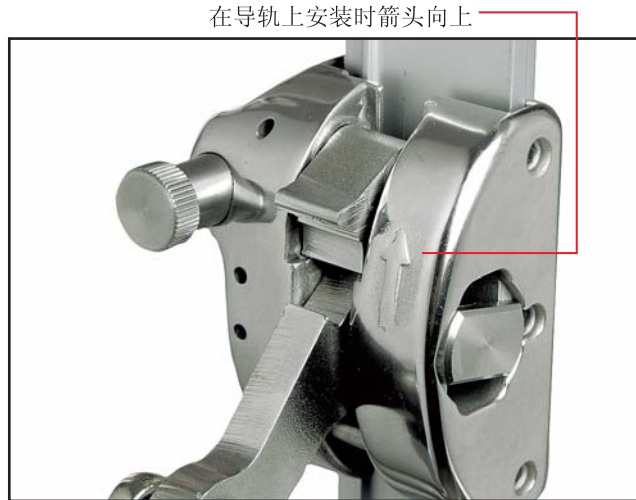
导轨和梯子：和专家联系，让专家替换/修理丢失的零件，对防坠落系统做一次详细的检查。

滑行装置：和专家联系，让专家替换/修理丢失的零件，对滑行装置做一次详细的检查。

# 9 标记



Eagle 滑行装置标记



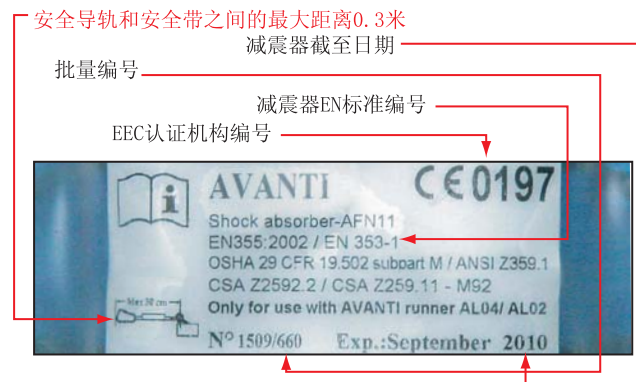
Eagle 滑行装置标记



滑行装置标牌



导轨标牌



减震器标签



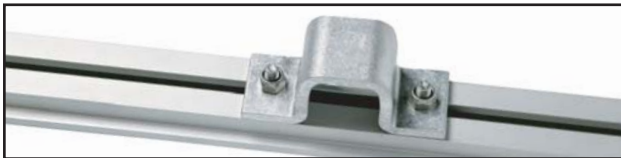
## 10 安装说明

- a) 专家负责安装防坠落系统配件。专家对安装负全责，保证按照说明书安装系统。
- b) 安装系统前，确保塔架能支撑负载。
- c) 确保安装 AVANTI 防坠落系统的梯子符合 EN 131 和 EN ISO 14122 的要求，例如内部梯蹬的宽度最小 340mm（所有 AVANTI 梯子满足这一要求）。
- d) 梯蹬形状不同于 AVANTI 的梯子要求特殊的梯蹬配件。这些必须要经过 AVANTI 认可。
- e) 安装防坠落导轨之前，确保所有零件齐全。参照交货时的零件列表，查看防坠落系统。

安装 AVANTI 防坠落系统之前，需要下列零件。



梯蹬配件



安装在安全导轨上的梯蹬配件



AVANTI Eagle 滑行装置



锤形头螺栓



两导轨和夹板接合



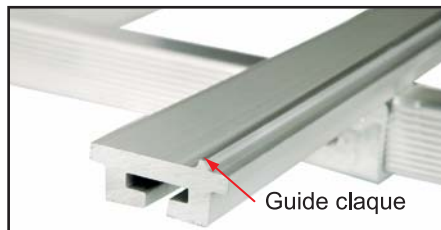
顶部按钮阻挡器



滑行装置

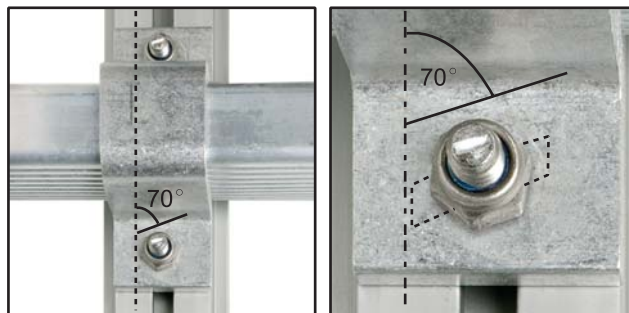
## 梯子上安装导轨

1. 导向结构(**guide claue**)位于左侧，安全导轨放置在梯子中间。



2. 用锤形头螺栓安装梯蹬配件如下：
  - a) 安全导轨梯子的顶部梯蹬。
  - b) 最少在每第 3 个梯蹬安装梯蹬配件；不允许在超过连续2截的梯蹬上不安装梯蹬配件。
  - c) 安全导轨梯子的底部梯蹬或底部的第二个梯蹬。
3. 每个导轨系统（长度 **6.0 米**）必须由至少 **6 个** 配件固定。
4. 每个导轨至少用 **3 个** 配件固定。底端导轨必须有 **3 个** 配件。
5. 使用夹板接合或 **U 型** 接合将多个梯节连接在一起。确保每一导轨末端使用 **2 个** 锤形头螺栓-即每一个夹板接合用 **4 个** 锤形头螺栓。导轨之间的最大距离 **4mm**。

6. 锤形头螺栓上的指示标记必须相对于安全导轨 **70 度** 角定位。（见下图）



7. 用 **6Nm** 的力矩拧紧锤形头螺母。
8. 必须使用自锁螺母，确保：
  - 螺栓自螺母起至少延伸半个螺纹直径。
  - 如果能手动松开螺母，则替换螺母。
9. 在安全导轨的顶部和底部安装一个挡块。
10. 在风机塔架内安装期间，在每截塔架部分的导轨顶部安装一个挡块。

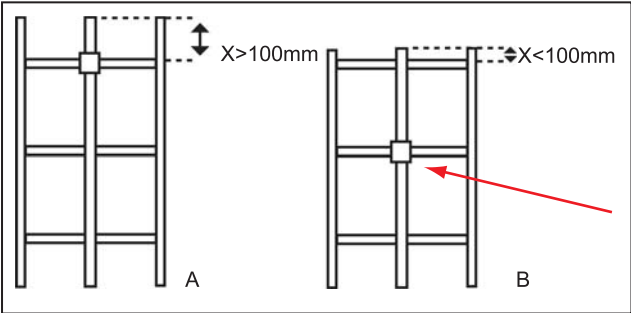
## 用法兰连接梯子和导轨

在塔架组装前如果导轨和梯子安装在风机塔架内，则在塔架组装期间需要调整梯子和导轨。请遵循以下的切割和装配说明。

### 梯子顶部:

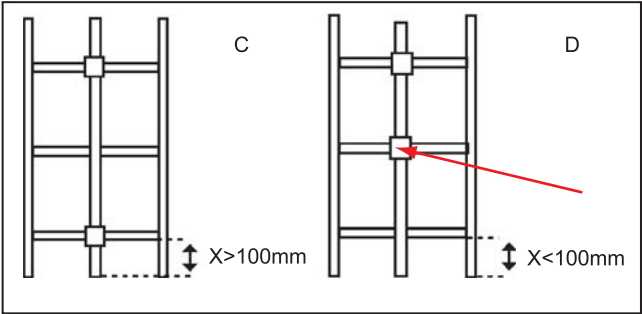
一个梯蹬配件总是安装在每一塔架部分的顶部梯蹬上。

1. 在踏板上方切去安全导轨后，安全导轨在踏板上方必须延伸至少 55mm。
2. 如果在踏板上的导轨被切去后少于 100mm ( $x < 100\text{mm}$ )，则梯蹬配件必须移到下一个梯蹬。



### 梯子底部

3. 在梯蹬下方的安全导轨被切割后，梯蹬下方的安全导轨必须延伸最小 55mm。
4. 如果梯蹬下方的导轨被切割后少于 100mm ( $x < 100\text{mm}$ )，导轨配件必须向上移动一个梯蹬(见下图 D)。



5. 如果不是底部塔架部分，则在最底部的两个梯蹬上必须有一个梯蹬配件。否则必须重新安装配件。

### 通用配件说明

- 防坠落系统应该配备原装系统零件。
- 所有系统元件必须现场检查，尽管梯子和导轨是工厂安装后一起交货。
- 梯子关节是为了减震和消减扭曲应力。安全导轨没有这个功能。



## 11 初次使用前检查

初次使用前，专家必须检查防坠落系统。为以后做参考，检查的结果要写入附带的测试履历并归档。

### 梯子梯蹬

确保凹陷、孔或者裂纹对踏台稳定性不产生任何影响。

凹陷在直径上不应超过 10mm，或者在深度上不大于 1mm。

如果在梯蹬的边缘或拐角处发现凹陷，则不能保证站台稳定性，应替换站台。

### 梯子梯柜

确保凹陷、孔或者裂纹对型式稳定性不产生任何影响。

凹陷在直径上不应超过 20mm，或者在深度上不大于 1mm。

如果在型式的边缘或拐角处发现凹陷，则不再保证型式稳定性，应替换梯节。

### 梯子连接

连接两个梯节时，梯节之间的间隙不应超过 30mm。

### 梯子末端

在梯子的顶端和底端，防护装置如 AVANTI 橡胶脚垫或端盖必须处于正确位置。在风机塔架建造期间，顶部挡块必须安装在每一个塔架部分上。

### 安全导轨

确保安全导轨配件根据上述安装手册安装。

确保没有毛边。

检查产品标记是否清晰可辨。如果标记不存在，则请专业人员替换产品。

确保安装了顶部停止装置。

### 安全导轨连接

确保在每个安全导轨上用两个锤头形螺栓的安装夹板接合，一个安全导轨使用 4 个螺栓，两个安全导轨之间最大允许留有 4mm 距离，锤头形螺栓上的指示记号被旋转 70 度角。

## Limited Warranty

Avanti Stigefabrik A/S warrants that commencing from the date of shipment to the Customer, and continuing for a period of the longer of 365 days thereafter, or the period set forth in the standard Avanti warranty, the Fall Protection System ("Product") described in this Manual will be free from defects in material and workmanship under normal use and service when installed and operated in accordance with the provisions of this Manual.

This warranty is made only to the original user of the Product. The sole and exclusive remedy and the entire liability of Avanti under this limited warranty, shall be, at the option of Avanti, a replacement of the Product (including incidental and freight charges paid by the Customer) with a similar new or reconditioned Product of equivalent value, or a refund of the purchase price if the Product is returned to Avanti, freight and insurance prepaid. The obligations of Avanti are expressly conditioned upon return of the Product in strict accordance with the return procedures of Avanti.

This warranty does not apply if the Product (i) has been altered without the authorization of Avanti or its authorized representative; (ii) has not been installed, operated, repaired, or maintained in accordance with this Manual or other instructions from Avanti; (iii) has been subjected to abuse, neglect, casualty, or negligence; (iv) has been furnished by Avanti to Customer without charge; or (v) has been sold on an "AS-IS" basis.

Except as specifically set forth in this Limited Warranty, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS

AND WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, SATISFACTORY QUALITY, COURSE OF DEALING, LAW, USAGE OR TRADE PRACTICE ARE HERBY EXCLUDED TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW AND ARE EXPRESSLY DISCLAIMED BY AVANTI. IF, PURSUANT TO ANY APPLICABLE LAW, TO THE EXTENT AN IMPLIED WARRANTY CANNOT BE EXCLUDED AS PROVIDED IN THIS LIMITED WARRANTY, ANY IMPLIED WARRANTY IS LIMITED IN TIME TO THE SAME DURATION AS THE EXPRESS WARRANTY PERIOD SET FORTH ABOVE. BECAUSE SOME STATES DO NOT PERMIT LIMITATIONS ON THE DURATION OF IMPLIED WARRANTIES, THIS MAY NOT APPLY TO A GIVEN CUSTOMER. THIS LIMITED WARRANTY GIVES CUSTOMER SPECIFIC LEGAL RIGHTS, AND CUSTOMER MAY HAVE OTHER LEGAL RIGHTS UNDER APPLICABLE LAWS. This disclaimer shall apply even if the express warranty fails of its essential purpose.

FORCE-Dantest CERT



## EEC type examination certificate for personal protective equipment

**Number: DK-0200- C.1553**

Issued by FORCE-Dantest CERT  
EEC-notified body number 0200

In accordance with the Directorate of National Labour Inspection's Regulation No. 1273 of December 18th 1996, which in Denmark implements The Councils directive No. 89/686, No. 93/68, No. 93/95 and No. 96/58, EEC type examination certificate is issued to:

	<b>AVANTI Stigefabrik A/S</b> <b>Høgevej 19</b> <b>DK-3400 Hillerød</b>
for protective equipment:	<b>Guided type fall arrester</b>
type:	<b>A system consisting of a guided type fall arrester, a textile damper, a safety hook and ladder sections mounted with slide bar - type 2002</b>
designated:	<b>Fall arrester type AVANTI Eagle System</b> <b>Textile damper type AFN 11</b>
manufactured by:	<b>AVANTI Stigefabrik A/S with sub-suppliers as stated in the appendix to the type examination certificate</b>

The examined samples are found to fulfil the requirements in DS/EN 353-1:2002 as well as the relevant requirements in Appendix II in Regulation No. 1273.

The type examined model and the basis for the type approval are described in the appendix to the type examination certificate. The manufacturer must inform FORCE-Dantest CERT of any contemplated changes.

This protective equipment is a category III equipment and therefore an agreement regarding control shall be arranged with a notified body according to the Regulation.

Date of issue: *2006-06-19*

Signature:

*Bent Larsen*  
Bent Larsen  
Director

*Niels Ovesen*  
Niels Ovesen  
Cert. Manager

FORCE-Dantest CERT  
Park Allé 345  
DK-2605 Brøndby  
Tlf. 43 26 70 00  
Telefax 43 26 70 11

## 1 Caution

- a) An expert is familiar with and is trained within the AVANTI Fall Protection system, the EN 363 and the EN 353-1.  
An AVANTI Fall Protection Technician has successfully participated in the AVANTI Fall Protection course and is considered an expert.  
A competent Person is familiar with the correct usage of the AVANTI Fall Protection system and have had an introduction to personal protection equipment.
- b) Assembly, maintenance and testing of the fall protection system may only by an expert.  
Only competent persons may use the system.
- c) Users are obliged to read and understand this User's Manual.
- d) A copy of the User's Manual must be handed out to the fall protection users and must be available for reference.
- e) If more than one person is trusted with one of the above tasks, the employer shall appoint a supervisor in charge of operation.
- f) If the fall protection system is re-sold outside the original country of destination the reseller shall provide instructions for use, for maintenance, for periodic examination and for repair in the language of the country in which the product is to be used.
- g) Please insure the ladder system with the Fall protecting System is capable of supporting:  
for USA: not less than 5000 lb (22,2kN) static load  
for Canada: not less than 27 kN  
for EU: 15kN

## 2 Danger

- a) The fall protection system may not be used by persons under influence of alcohol or drugs that may jeopardize working safety.
- b) Only people introduced to the AVANTI fall protection system by an expert may use the system.
- c) The owner must ensure that a rescue plan that deal with any emergencies that could arise during work is in place and that the users are familiar with this.
- d) If any damager or faults are found during operation, or in case of circumstances which may jeopardise safety:  
- Immediately stop the work in progress  
- Contact the site responsible e.g. the turbine owner or the site foreman.
- e) No warranty is provided against damage resulting from reconstruction or modification of equipment or use of non-original parts which are not approved by the manufacturer.
- f) The fall protection system may not be used outside its limitations, or for any purpose other than that for which it is intended.
- g) The AVANTI fall protection runner should be handed out and treated as a personal protection equipment.
- h) Keep a distance of 6 meter between each user during ascend and descend. No more users may use the 2 x 6 meter rail simultaneously as this will jeopardize the system statics.
- i) The first two meters the user may not be protected against hitting the ground. Take precautions.
- j) Prior first use an expert must inspect the system.

## 3 Description of equipment

- k) If oil, grease or the like has leaked onto the safety rail – wipe it of.
- l) If oil, grease, chemicals or the like has leaked onto the shock absorber or in any kind been in contact with the webbing, have an AVANTI fall protection technician replace the shock absorber.
- m) After 5 years of use replace the shock absorber. Date of expiration is printed on the shock absorber label.
- n) Operation temperature -35° / +60° Celsius.
- o) In connection with the fall protection system only full body harnesses approved according to EN 361 may be used.
- p) The complete fall protection system has been manufactured and approved according to EN 353-1.
- q) Ladders supplied by AVANTI comply with the requirements of EN 131 and EN ISO 14122.
- r) The Avanti supplied CE-marked carabiners is approved according to EN 362 and the AVANTI shock absorbers is approved according to EN 355.
- s) All parts and units have been especially developed for the AVANTI Fall Protection System Type 2002 and as such cannot be used in other fall protection systems.
- t) These instructions must be kept together with the fall protection system.

The tower owner must verify the need for 3rd party fall protection device inspections with the local authority and comply with the standards specified.

### 3.1 Purpose

#### **The Fall Protection Device in this User's Manual serves the following purposes:**

- The fall protection system is intended for use during ascent and decent on stationary ladders installed in towers, pylons, well shafts, manholes etc.
- The fall protection system is a safety device which prevents falling /reduces personal injuries if fall occur.
- The fall protection safety rail is designed for permanent installation in one place.

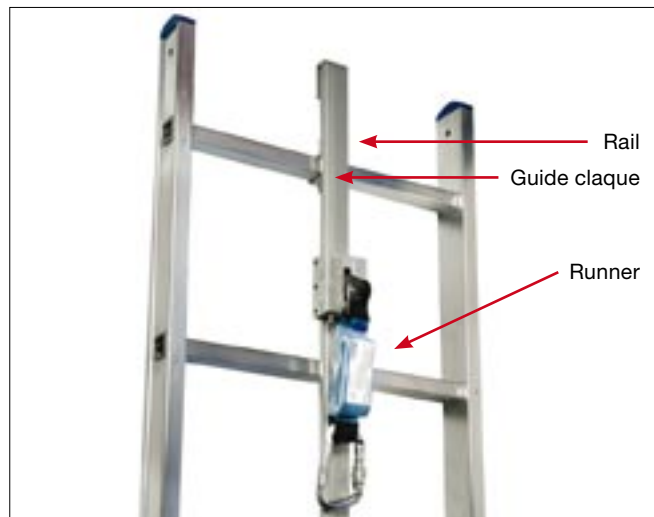
#### **The Fall Protection Device is not designed for:**

- For securing horizontally,
- For securing equipment,

### 3.2 Function

The Fall Protection Device comprises a safety rail mounted on a ladder and a runner who can be clicked onto the rail. The user attaches the runner to his harness by means of an integrated shock absorber and carabiner. When starting the climb he/she clicks the runner onto the safety rail. When climbing the runner glides upwards on the safety rail. In case the user experiences a fall the runner will lock onto the safety rail and prevent a fall.

### 3.3 Component overview:



Rail and runner on ladder

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Runner



Eagle runner

## 4 Daily inspection

- 1) Before use the runner must be checked for visual damage, wear and tear, and other defects. Pay especially attention to the shock absorber.
- 2) During ascent look for visible damage and loose parts along with loose bolts on ladder, rail or joints.
- 3) Equipment with defects or equipment that leaves doubt concerning safe use must be checked by an expert.



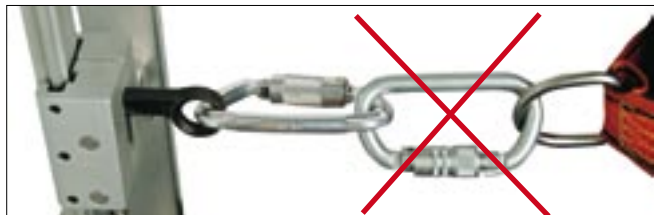
STOP if the runner looks defect / or parts are missing do not use it.

## 5 Directions for use



### **DANGER!**

- The runner, the shock absorber, and the carabiner comprise a safety system. Never adapt, extend, or in any way change this system.
- The runner may only be used if the bottom left steel tap lock has popped out in lock position.
- The arrow on the runner must point upwards – otherwise it will not block a fall.



### Instructions:

- a) Before using this fall protection system make sure to wear an approved harness worn in accordance to the producer's prescriptions.
- b) Fasten carabiner to harness in chest or waist D-ring.
- c) With the arrow pointing upwards the runner is clicked onto the safety rail. (see pictures below)



Open runner by pushing bottom left steel tap lock and pull left and right runner side apart. Place one of the runner sides on its respective safety rail side with the runner arrow pointing upward (1).

2



While lifting the break lever, tilt the runner so both runner sides are round each side of the safety rail (2)

3



Push the two runner body parts together until the bottom left steel tap lock pops back in position and locks the runner body. Make sure it is locked correctly (3).

Remove runner by pushing the bottom left steel tap and pull the runner sides apart.



**Before dismounting assure you are safe or use another fall protection device.**



**DANGER!**

If the fall protection device has blocked a fall take the ladder out of use. Contact a Fall Protection Technician so he can replace the affected ladder/rail section.

## 5.1 Directions for use of AVANTI Eagle



**DANGER!**

- The runner, the shock absorber, and the carabiner comprise a safety system. Never adapt, extend, or in any way change this system.
- The arrow on the runner must point upwards – otherwise it will block a fall.
- If the runner looks defect / or parts are missing do not use it.

**Instructions for AVANTI Eagle:**

- a) Before using this fall protection system make sure to wear an approved harness worn in accordance to the producer's precipsions
- b) Fasten carabiner to harness in chest or waist D-ring.



**Opening the AVANTI Eagle**

Must always be done without load and when there is no risk of falling.

- 1) Turn the thumbscrew clockwise until it is fully inserted (photo 1 A)



1A



- 2) Push first the lock pawl and then the brake lever upwards – both in the direction of the arrow – and hold them in position (photos 1B and 1BB).

1B



1BB



- 3) Open the Eagle Runner by pulling at the right side at right angles to the rail (photo 1C).

1C



## Mounting the Eagle Runner

- 1) Turn the arrow on the body upwards.
- 2) The Eagle Runner must be open before it can be mounted on the rail (see page 10 and 11).
- 3) Press the Eagle Runner around the rail with the brake lever raised (photo 2A).
- 4) Release the brake lever when the runner have been pressed together. The lock pawl jumps back against the brake lever and locks it (photo 2 B).

2A



2B



2D



- 5) Turn the thumbscrew anti-clockwise to the end stop (photo 2D).
- 6) The thumbscrew must always be fully screwed out to the stop during use.
- 7) Test the Eagle Runner without load before use. This is done by lifting the closed runner upwards and then pulling downwards – it should then lock.

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#### **During use of the Eagle Runner**

- When the Eagle Runner is in use, the thumbscrew must always be fully screwed out (counterclockwise) to the end stop, so that the lock pawl cannot be lifted.
- Use only undamaged and correctly mounted runner and rail.

## **6 Maintenance**

- a) Dry runner and rail with a cloth.
- b) Keep all parts free of oil, grease, and chemicals.
- c) Never place liquids or sharp objects in the vicinity of the fall protection system as these may damage the equipment.

- d) The harness can be cleaned using a weak sulpho-solution and a soft brush. Subsequently, rinse with pure water.
- e) If the equipment gets wet air-dry naturally. Do not use any kind of heating.
- f) Store runner out of direct sunlight and protected from heat and dust.

**At least every 12 months an inspection by an AVANTI fall protection expert shall be carried out.**

## **7 Yearly inspection**

Once a year an expert must inspect the fall protection system paying special attention to the safety rail and the runner. If not - this will void the warranty.

Are the yearly tests not performed the warranty is void, and AVANTI renounce all liability and claims that may appear.

AVANTI runs “fall protection technician classes” on regular basis. If interested contact AVANTI.

## **8 Ordering spare parts**

When parts are found to be missing stop working.

Rail and ladder: Contact an expert and let him/her replace/repair the missing parts and carry through a fall protection system inspection.

Runner: Contact an expert and let him/her replace/repair the missing parts and carry through a runner inspection.

## 9 Marking

Read instruction before use  
 AVANTI Eagle production no.  
 EC Standard no.  
 Product name  
 EEC-notified body no.



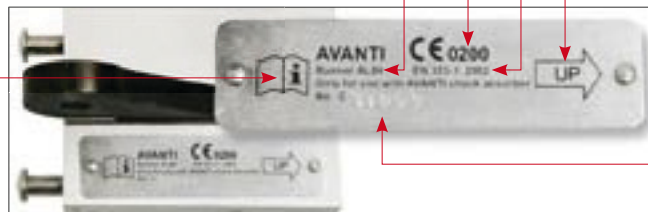
Eagle Runner marking

Upward direction when mounted on rail



Eagle Runner marking

Upward direction when mounted on rail  
 Read instructions before use  
 Runner production no.  
 EC Standard no.  
 AVANTI product name  
 EEC-notified body no.



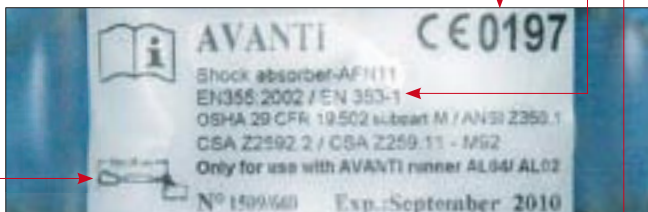
Runner rating plate

EEC-notified body no.  
 EN Standard no.  
 Production batch no.  
 Read instructions before use



Rail rating plate

Max distance between safety rail and harness 0,3 m  
 Shock absorber expiration month  
 Batch no.  
 Standard EN no. for shock absorber  
 EEC-notified body no.



Shock absorber lable

## 10 Fitting instructions

- a) An expert must be in charge of the fall protection system fitting. The expert takes full responsibility for the fitting and guarantee that the installation is done in accordance to these instructions.
- b) Prior to mounting the system, ensure that the tower involved will be able to carry the load.
- c) Ensure that the ladder intended for mounting the AVANTI fall protection system comply with the requirements of EN 131 and EN ISO 14122. E.g. internal rung width must be minimum 340mm (All AVANTI ladders do)
- d) Ladder with rung geometries that differs from AVANTI's may call for special rung fittings. These must be approved by AVANTI.
- e) Before installing the fall protection rail ensure that all parts are present. Refer to parts list delivered along with the fall protection system.

Installing the AVANTI fall protection system you will need the following parts.



Rung fitting



Rung fitting mounted on a Safety rail.



AVANTI Eagle Runner



Hammerhead bolt



Two rails and fish joint



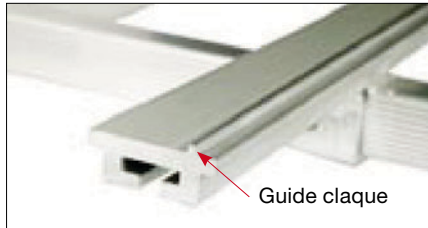
Top and button stopper



Runner

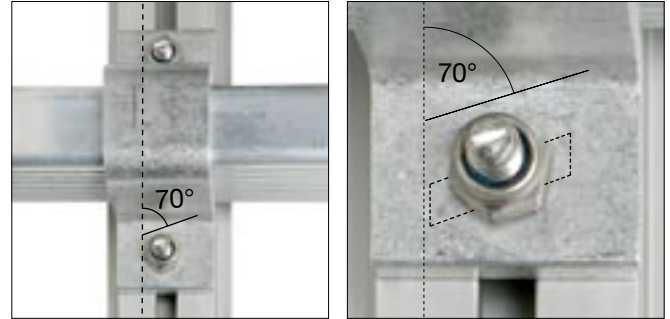
## Mounting of rail on ladder:

1. Place the safety rail in the centre of the ladder with **the guide claque situated in the left side.**



2. Mount the fall protection rung fittings with hammerhead bolts as follows:
  - a) At the top rung of the safety rail ladder.
  - b) At min. every 3rd rung never allowing more than 2 rungs in a row without rung fitting.
  - c) At the bottom or second last rung of the safety rail ladder.
3. Each rail system (6,0 m length) must be fastened with at least 6 fittings.
4. Each rail must be fastened with at least 3 fittings. The bottom end rail must though have 3 fittings.
5. When joining more ladder sections use profile fish joints or U-profile. Assure that 2 hammerhead bolts are used for each rail end - that is 4 per fish joint. Max distance between rails is **4 mm**.

6. The indicator mark on the hammerhead bolt must be positioned in an angle of  $70^\circ$  to the safety rail. (see fig below)



7. Tighten the hammerhead nut with 6 Nm.
8. Self-locking nuts must be used at all times, ensure that:
  - The bolt extends from the nut by at least half of the thread diameter.
  - If it has become possible to loosen the nut by hand replace the nut.
9. At the top and bottom of the safety rail mount a stopper.
10. During installation in wind turbine towers mount a stopper on the rail top of each individual tower section.

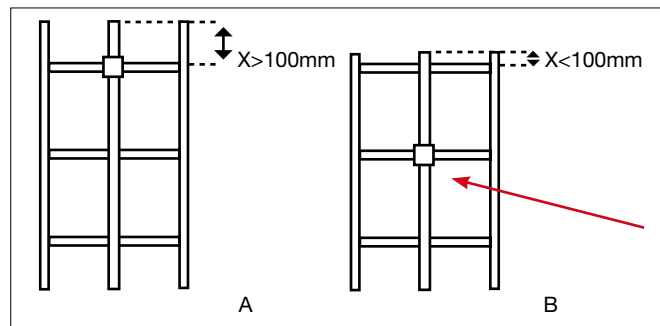
## Connection of ladder and rail in flange connections.

In case the rail and ladder is installed in a wind turbine tower before the tower is assembled the ladder and rail may need adjustment during tower assembly. Please follow the cutting and fitting instructions below.

### Ladder Top:

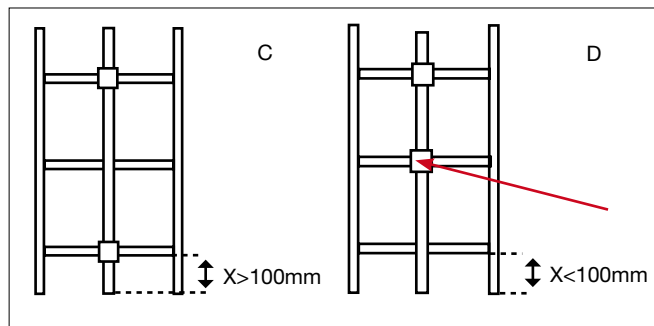
A rung fitting is always mounted on the top rung of each tower section.

1. After cutting-off the safety rail above the step, the safety rail must extend minimum 55mm **above** the step.
2. If the rail is cut to less than 100 mm **above** the step ( $x < 100$  mm) the fitting must be moved down



### Ladder Bottom:

3. After cutting-off the safety rail **below** the rung, the safety rail must extend minimum 55mm below the rung.
4. If the rail is cut to less than 100 mm **below** the rung ( $x < 100$  mm), the rung fitting - if any, must be moved up one rung (See fig. D below).



5. If it is not a bottom tower section there must always be a rung fitting on one of the two lower rungs. If this is not the case this must be retro fitted.

### General fitting instructions:

- The anti-fall system shall only be fitted with original system parts.
- All system elements must be checked on site, even if the ladders are supplied with the rails already fitted.
- The ladder joints are to absorb the vibrations and torsional stress. Not the safety rail.

# 11 Inspection before initial use

Before first use an expert must inspect the fall protection system. The result of the inspection must be entered in the enclosed test journal and filed for later reference.

## Ladder rung:

- Ensure that no dents, holes, or cracks have any influence on the step stability.
- Dents may not exceed 10 mm in diameter or be more than 1 mm deep.
- If dents are found on the rung edges or corners the step stability can no longer be guaranteed. Replace step.

## Ladder style

- Ensure that no dents, holes, or cracks have any influence on the style stability.
- Dents may not exceed 20mm in diameter or be more than 1 mm deep.
- If dents are found on the style edges or corners the style stability can no longer be guaranteed. Replace the ladder section.

## Ladder connections

- Connecting two ladder sections the gap between the two parts may not exceed 30 mm.

## Ladder end

- On the top end and bottom end of the ladder a protection guard such as the AVANTI rubber feet or end cap must be in place. During construction of wind turbine towers a top stopper must be mounted on each individual tower section.

## Safety rail

- Ensure that the safety rail fittings are mounted according to the installation manual above.
- Ensure that no sharp edges are present.
- Check the legibility of the product marking. If marking is not present have an expert replace them.
- Ensure that a top stop is mounted.

## Safety rail connections

- Ensure that profile fish joints are mounted using two hammerhead bolts, 4 in total, on each safety rail section leaving max **4 mm** between each safety rail, and that the indicator mark on the hammerhead bolt is turned 70°

