

AIRWORTHINESS ALERT 2022-1 **TOST E 22 Aerotow Release**

OVERVIEW

There have been several reports of uncommanded release occurrences of sailplanes fitted with the TOST E 22 aerotow release. These releases are of light construction and are currently used by manufacturers of performance sailplanes like the ASG 29, AS 33, Ventus-3 variants and others.

INVESTIGATION

Incident 1: An Alexander Schleicher ASG 29 (ASW 27-18) fitted with a TOST E 22 release recently suffered an uncommanded release on hook up prior to launch. The TOST rings literally fell out of the closed release when the rope was rattled.

The investigation revealed a fully functional release system and release. The release showed little wear, was in good condition and deemed serviceable. The sailplane had logged 388 launches. The TOST rings used in this case measured 4.66mm. New TOST rings measure 6.7-7.0 mm.



Figure 1: TOST E 22 release. Beak when fully closed has 3mm gap

It was also noted that the E 22 beak when fully closed was about 3mm short of the casing slot. This was confirmed to be normal as per the TOST design. Subsequent tests carried out on the release using the same worn rings with 4.66mm diameter showed that with only slight upward angle of the tow rope, the curve of the rings would slip under the closed beak.

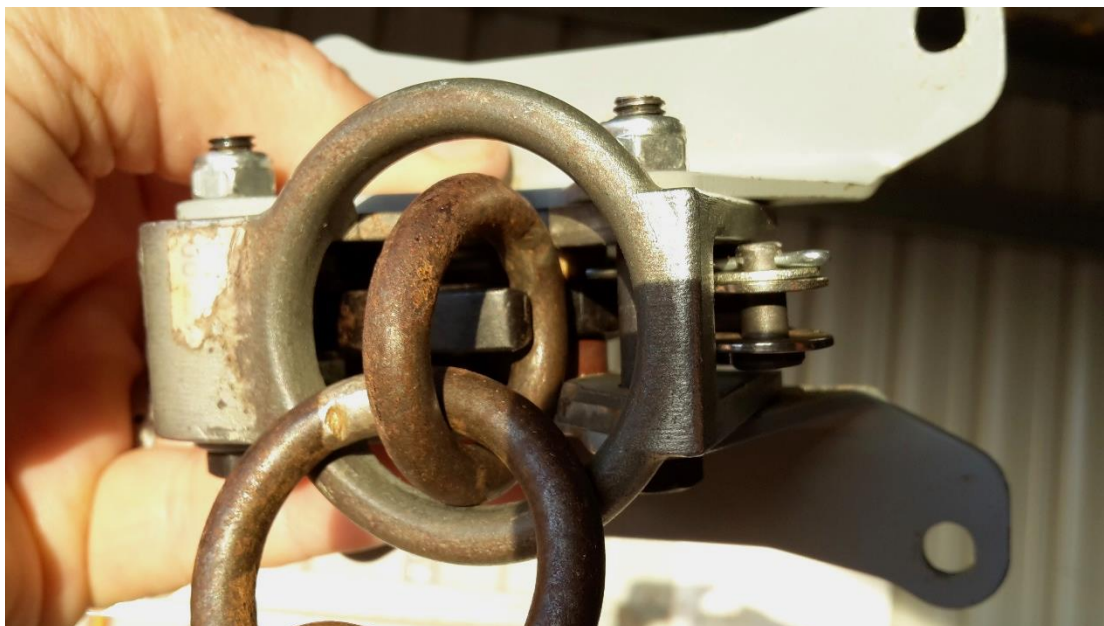


Figure 2: TOST E 22 release. Worn rings wedging under beak.

Incident 2: An Alexander Schleicher ASG 29 (ASW 27-18) fitted with a TOST E 22, suffered an uncommanded release on takeoff when full of water.

The investigation revealed the release incident occurred with rings measuring 5.1 mm, well below the original 6.7-7.0 mm tolerance. Note that this sailplane had logged approximately 300 launches only.

CONCLUSIONS

Both Incident 1 and 2 in this alert operate using sealed runways. Clubs that operate predominantly on bitumen with long tug taxi runs suffer accelerated ring wear. Worn TOST rings may still operate safely in most TOST releases but NOT the E 22.

The following is an extract from correspondence received from TOST:

The release E22 was designed and certified to be only operated with the connecting ring pair according to LN 65091. According to the aerospace norm LN 65091 the circular link (the small ring) needs to have a diameter of 7 mm (tolerance: +0,0 mm and -0,3mm). A diameter of 5,1 mm is way too far from any allowable tolerance. Please do not use connecting rings with a diameter of 5 mm with our releases, that's very dangerous.

Sailplanes fitted with a E 22 release if not using rings meeting new or close to new dimensions have an increased risk of an uncommanded release.

*Refer Annex A - Connecting ring pair / New edition 2005 of LN 65091

RECOMMENDATION / ACTION

The GFA currently have no standalone guidance material on the TOST E 22 release and permitted TOST ring wear tolerances. The GFA recommends following manufacturers guidelines.

Annual Inspectors Maintenance Authority Holders

The holder of an Annual Inspector Maintenance Authority should be very aware of the TOST E 22 limitations and associated risk potential. The release must be rigged as per BSE / Operating Manual for Tow Releases Series - TOST Release E 22 (attached as Annex B), meet the design specifications, and exhibit no wear to ensure reliability.

Inspectors must understand the unit is of a much lighter aluminum / steel construction which is subject to chassis deformity and premature wear. Any wear or deformity must be rectified at maintenance. This release requires TOST rings measuring to new / nominal dimensions. TOST ring wear proportionally increases the risk potential for the uncommanded release.

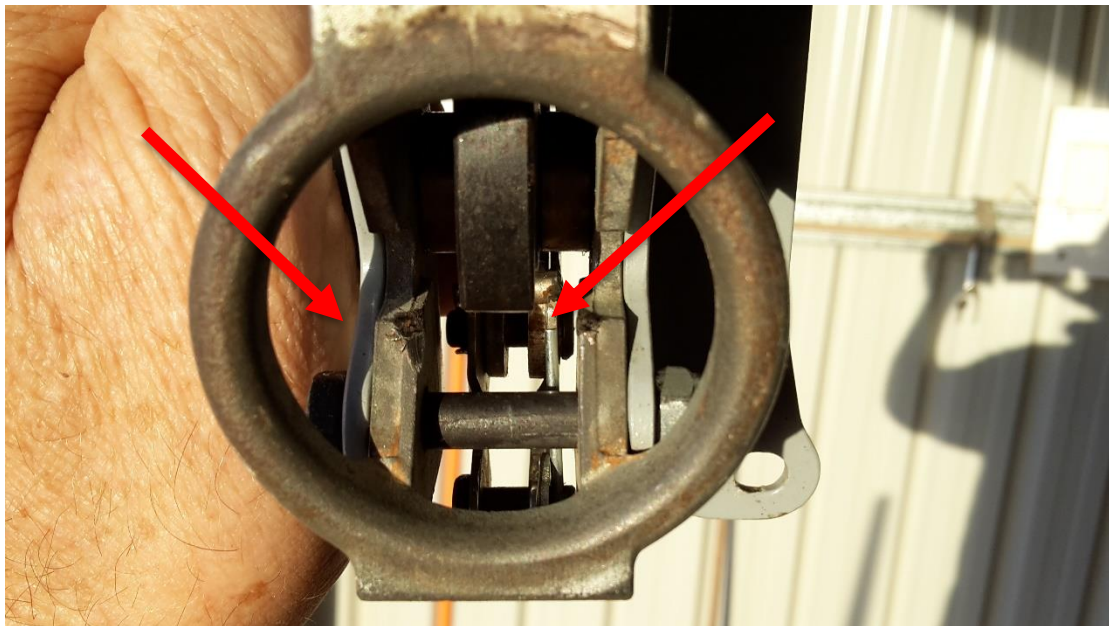


Figure 3: TOST E 22 release. Note the wear on the side plates.

The TOST E 22 is a lightweight release using a combined aluminum and steel structure. It is subject to wear of the beak and side plates. The side plates and case are lightly built and are subject to deformation.

This AWA document is issued to raise awareness to the increased risk to operators if operating with a worn or deformed E 22 release and/or worn TOST rings.

REPORTING

Notify the GFA in the usual manner if you have information relating to any similar or related occurrence.

A handwritten signature in black ink, appearing to read 'Dennis Stacey', with a long horizontal line extending to the right.

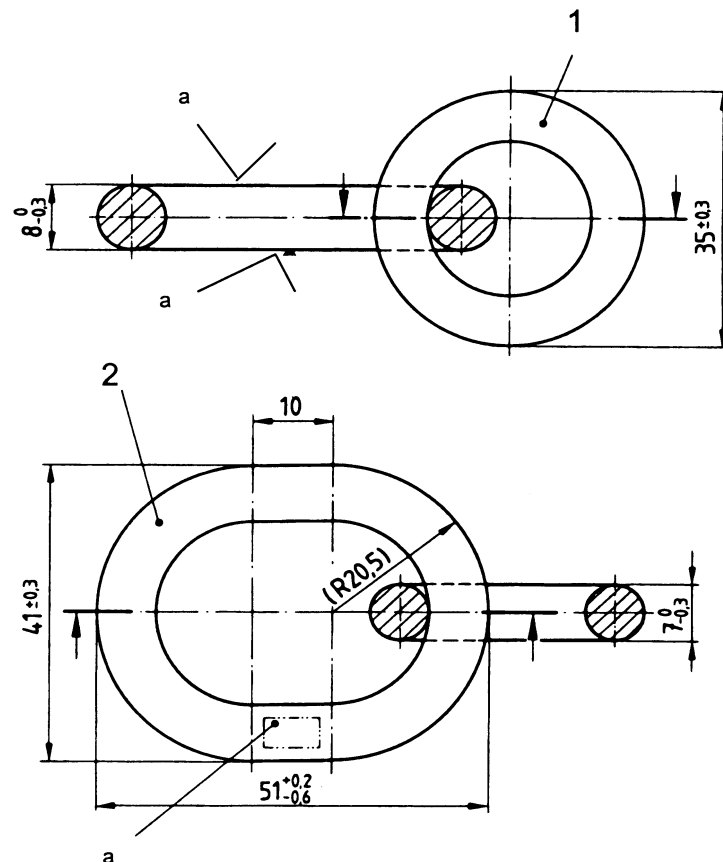
Dennis Stacey
GFA CTO
22/07/2022

Connecting ring pair

New edition 2005 of LN 65091 (supersedes edition 1985-12)

This standard specifies the characteristics of connecting ring pairs for tow releases for tow launching of aircrafts, non-controllable tow-trailers and for winch launching for aerospace applications.

Dimensions



Most important attribute:

The links of the connecting ring pair shall not be welded!

Permissible constant load:

The permissible constant load shall not exceed 15 kN (i. e. it must withstand this load without deformation). A momentary (3 seconds) load of 18 kN is permissible.

Operation and technical specification:

Prior to each commissioning of the connecting according to LN 65091 testing shall be carried out for scratches, cracks and burrs in accordance with DIN EN ISO 8785 as well as for permanent deformation.

Surface imperfections and permanent deformation shall be determined by visual inspection. **The detectable deformations and surface imperfections, which were determined during the test, are not permitted.**

All connecting ring pairs supplied according to this standard **shall be accompanied by an EASA Form-1** issued by the manufacturer for each production lot.

Operating Manual

for
Tow Releases

Series:

Tow Release E 22

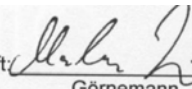
Date of Issue: October 2002


Approval

No 11.402/9 NTS

acc. JAR-21 German, section O and

NTS 9

Unterschrift: 
Signed: Görnemann



April 16, 2003

The release may be used only in compliance with the instructions and limitations set out in this manual.

The English translation has been made to the best of our knowledge and belief, but in case of uncertainty the German original is authoritative.

0.1 Document History

All changes to this operating manual must be recorded in the table below and, in the case of the approved sections, endorsed by the Luftfahrt-Bundesamt (German aviation authority).

New or amended sections will be identified by a vertical black line in the margin. The revision number and the date will be printed at the bottom right of the page.

Revision number	Section/ Page(s)	Revision date	Reference	Approval	Publication	Signed
1	1	5/ 2003	NTS approval	16.4.2003	5/2003	Fenzl

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(non-approved section)

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Operating Instructions

1. General Information

1.1. Introduction

This operating manual is intended to provide glider manufacturers, pilots and flying instructors with the information needed to install and operate the releases safely.

The manual includes the data which must be made available according to German airworthiness regulations for tow releases (Lufttüchtigkeitsforderungen für Schleppkupplungen - LFK). It also contains additional information and recommendations which the manufacturer feels will be helpful.

1.2. Certification basis

The release **E 22 Tow Release** has been approved by the German aviation authority (Luftfahrt-Bundesamt) on the basis of the guidelines for testing tow releases (Lufttüchtigkeitsforderungen für Schleppkupplungen, STR 9) dated March 20, 2002. The certificate No. 11.402/9 NTS is dated April 16, 2003.

1.3. Warnings, cautions and notes

There are three types of note in this manual and their importance for the safe and easy operation of the releases is defined as follows:

WARNING

Ignoring an instruction of this type results in either immediate danger, or considerable risk, to flight safety.

CAUTION

Ignoring an instruction of this type leads to a minor or a more or less long-term reduction of flight safety.

NOTE

This heading draws attention to an item which is important or unusual, although it may not be directly related to safety.

1.4. Description of the release

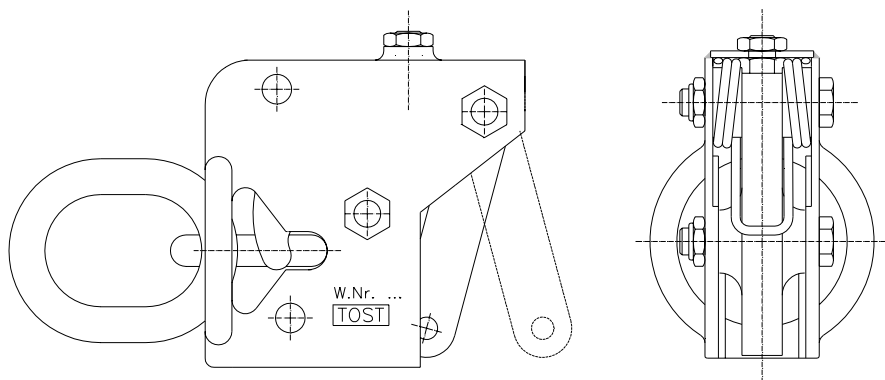
The TOST Tow Releases, E 22 (German TC No. 11.402/9 NTS) can be installed:

- near the nose of a glider or powered glider
- near the tail of the aircraft used to tow aircraft or banners

Release does not occur automatically. The housing, hook and segment are made of precision cast, high-grade steel. There is a setting screw countersunk in the housing. Over-center locking and release mechanism.

WARNING

Modified versions of the release may be built into a glider or powered glider only in accordance with the glider manufacturer's specifications.

1.5. Construction drawing**2. Limitations****2.1. Introduction**

The operating limitations and instructions in this section are vital for the safe operation of both the release and the aircraft in which the release is installed.

The limitations and procedures in this section have been approved by the German aviation authority (Luftfahrt-Bundesamt).

2.2. Installation point

The position where the tow release is to be installed is specified by the aircraft manufacturer:

- near the nose in a glider or powered glider
- near the tail in towing aircraft

WARNING

The installation point specified by the glider manufacturer may under no circumstances be changed.

2.3. Cable load

Maximum permissible cable load $Q_{\max} = 10.7 \text{ kN (2354 lbs.)}$
(i. e. max. weight) $m_{\max} = 700 \text{ kg}$

2.4. Angles

Maximum permissible cable angle $\alpha = -90^\circ$ upwards
 $\alpha = +90^\circ$ downwards
and associated lateral angle $\beta = 0$ to 90° to either side

2.5. Forces

Maximum permissible release force $P_K = 140 \text{ N (31 lbs.)}$
Maximum restoring force $P_R = 50 \text{ N (11 lbs.)}$
(measured at the release lever on the release with a reference length of $l = 68 \text{ mm (2.7 inches)}$ - without release cables - in rest position)
 P_K is the force which must be applied to the release lever, in original condition, to open the release manually.
The magnitude of the force P_K is directly dependent on the effective length of the release lever. For this reason no modifications may be made to the shape and/or length of this lever as specified by the glider manufacturer.

CAUTION

If the manual release lever is lengthened, there is a possibility that additional frictional forces may act on the tackle attached to this lever. The friction could reduce the available restoring force P_R , which is necessary to return the release completely to its locked position. This could negate the over-center locking feature, thus causing a premature release of the glider while under tow.

2.6. Towing device specifications

The connecting ring pair to LN 65091 (currently valid version only) must be used to connect the hook of the release to the towing cable.

2.7. Period of operation / number of takeoffs (TBO)

Maximum period of operation between two general overhauls

= 2000 takeoffs

(equivalent to 10.000 actuations/releases see also 10.1)

2.8. Types of operation

The tow release may be used in:

- gliders and powered gliders for aircraft tow
- aircraft
 - for towing gliders and powered gliders
 - for towing non-steerable banners

3. Normal Operation**3.1. Introduction**

This section contains checklists and describes normal operating procedures.

CAUTION

The release is not only a means of load transmission, it is also a safety device. Critical situations occur more frequently in the use of releases than, for instance, of parachutes.
Here too, failure or malfunction can be fatal.

For this reason you should make a practice of carefully checking the release and the manual release mechanism before each takeoff (see 3.2). If you find the release has been damaged, or does not function correctly, then it must be taken out of service immediately. On no account should you attempt to repair or adjust the release yourself. It should be sent back to TOST for repair (see Maintenance and Service).

WARNING

If you wish to continue using the aircraft, and you cannot eliminate the tow release problem yourself, i. e. by greasing or cleaning, you should remove the tow release from the aircraft. Gliders and powered gliders can use the center of gravity release instead, depending on the manufacturer's instructions.

When the release is under load, the actuation arm need be moved only a few millimeters for the tow cable to be released or dropped (unlocking occurs when the dead center point is passed). There is an audible click as the mechanism unlocks.

If the tow cable is under a reduced load, or no load at all (if the glider overruns or overshoots the cable), the tow ring pair, along with the cable, will be released and dropped only when the release mechanism has been fully actuated. To be 100% sure the cable has been released, you should actuate the release completely several times.

For further information refer to the aircraft's operating manuals.

3.2. Pre-takeoff checklist

3.2.1. Functional check

Does the release hook open completely, i.e., until it touches the ring, when the release cable in the cockpit is pulled to its fullest extent? This should be the case even when two releases are attached to a common release cable.

3.2.2. Is the manual release lever, or the segment of the release mechanism, rubbing against the aircraft's fuselage or the pilot's seat?

When you let go the manual release cable, does the release hook return completely to the closed position?

Does the hook open correctly when the cable is under load?

3.2.3. Is the release free of dirt?

3.2.4. Is the tow cable fitted with a tow ring marked LN 65091, as specified for the release?

3.3. Normal use of the tow release in aircraft-towed takeoff

The procedure for takeoff is fully described in the aircraft's operating manual. Release is possible at cable angles $\alpha = -90^\circ$ to $+90^\circ$, and $\beta = 0^\circ$ to 90° to either side (see 2.4).

WARNING

The nose tow release does not operate automatically. To make quite sure that the cable has been released, you should activate the release completely several times.

Maintenance and Service

4. General

This section contains notes, instructions and checklists for maintenance and service, and for installing and removing the releases. You will find all the information you need to maintain your release in a safe condition.

If the release of a glider or a powered glider is inoperable or damaged, it must be removed and returned to TOST for overhaul and repair.

WARNING

Do not attempt to alter, repair or adjust the release yourself. Leave this job to the experts! Tampering with the release voids the aircraft's airworthiness.

It is important to make sure that the manual release mechanism in the cockpit is free of friction. This is important for the following reasons:

- to ensure that the force required to actuate the release manually is not too great
- to ensure that the restoring force of the spring attached to the segment is not offset by too much friction in the release mechanism. This can prevent the hook from reaching the locking (over-center) position, which could result in the release opening prematurely (see 9.1).

The aircraft manufacturer has installed the release in such a way that you can check it visually.

It is important to make yourself familiar with and follow the aircraft manufacturer's instructions.

5. Installation

5.1. General

WARNING

When you install a release which has been repaired or overhauled, check that you do in fact have the correct release; either an E 22 or the modified version approved for your type of aircraft. Verify that the correct release lever is mounted.

CAUTION

If you are not 100% certain, check the aircraft operating manual, or contact the aircraft manufacturer.

5.2. Installation position

Do not change the glider manufacturer's original positioning of the release.

WARNING

Before removing the release, make a sketch, or take a photo, as a record for installing it again.

5.3. Tools needed

You need only some basic tools to install or remove the release in one piece - a No. 5 Allan key, a 10 mm closed-end wrench, or two 10 mm open-end wrenches.

5.4. Installation

To install a release use DIN 931-10.9, or DIN 912-12.9 M6 bolts and DIN 985-M6-6 hexagon nuts.

WARNING

New bolts must have the same shaft length as the original ones. It is especially important that the thread is not subjected to load, and that the shaft does not protrude more than the thickness of a washer beyond the mounting, as the nut cannot then be tightened properly.

Torque: $M_A = 8.75 \text{ Nm}$ (77.5 lb-in)

The release must be installed so that it is not under stress. When a release has been removed, new nuts and bolts should be used when it is reinstalled.

5.5. Checks

- The moving parts must move easily.
- The manual release cable must allow at least 10 mm extra length (dead travel) to ensure that the release mechanism can lock into position correctly.

6. Set screw

The function of the set screw on the upper side of the release is only to adjust the force needed to operate the manual release.

WARNING

The set screw and central and segment bolts are sealed with blue paint and/or closed with a cap. **The cap may not be removed and the set screw may only be adjusted by the manufacturer.**
The seals may only be removed by the manufacturer.
Any action will end the manufacturer's guarantee!

7. Checklist

7.1. Checks after installation

After installing a release, and as part of the periodic aircraft inspections, these checks must be carried out:

1. You must be able to open the unloaded release completely by applying a force of 75 ± 15 N (16.5 ± 3.3 lbs.) - measured on a spring balance - on the manual release lever in the cockpit over the full travel of the release actuation arm.
2. When the release hook is under a load of approx. 1.5 kN (330 lbs.), you should still be able to operate the manual release lever in the cockpit with the same force, i.e., 75 ± 15 N (16.5 ± 3.3 lbs.).
3. If both a nose and a center-of-gravity release are connected to the same release cable, the manual force required to operate them from the cockpit may not exceed 170 N (37 lbs.), even if one of the releases is under a load of 1.5 kN (330 lbs.).

7.2. When the manual release force

is transmitted directly to the release mechanism, **the release path of the release cable from the cockpit has a maximum length of 80 mm (3.1 inches)**, including the 10 mm dead travel. **Any altered length may never exceed 120 mm (4.7 inches)** - including the 10 mm (0.4 inches) dead travel. One result of this change is that the manual force required to operate the release will be less than specified in 7.1. If your aircraft has this longer release path, you must make absolutely sure that the force which is required for the segment spring to lock the release closed, is not offset by friction on the release cable between the cockpit lever and the release mechanism (see also 7.1.2).

WARNING

When you release the cockpit release lever, the hook must close and the mechanism lock completely, otherwise there is a danger of the hook opening prematurely under load.

7.3. Friction on the release cable

may not reduce the restoring force P_R by more than 10 N (2.2 lbs.). Thus a restoring force of 15^{+10}_{-0} daN (3.3^{+2}_{-0} lbs.) must be maintained at the release itself. If not, check and adjust the release cable, or find and remove the source of the friction.

7.4. If the results of these measurements

are in line with the specified values and the checks are carried out satisfactorily, then you can be sure that the release is operating within the limits set out in Section 2.

8. Care and Cleaning

The release is largely protected against corrosion. But certain components like the hook cannot get surface protection due to strength reasons. Therefore regular cleaning and servicing is imperative for maintaining the required security level.

8.1. Regular check

During operation and especially when landing away from paved runways, your release is exposed to dirt and pollution. So it is important to check the release before and at the end of every flight operation (see 3.3) and to clean it if necessary. **This point is indispensable especially if not used daily.**

8.2. If the release is hard to operate,

If the mechanism, in particular the hook, is not moving freely, wash off the dirt, dry the release with compressed air (to prevent corrosion) and lubricate it. To lubricate, we recommend you use an acid-free, spray-on oil, e.g., WD-40. Then actuate the release lever several times until the mechanism moves freely.

9. Malfunction - Causes and Correction**9.1. Premature release**

Premature release under load will occur only if the release mechanism did not lock correctly (pass over-center) in the first place. Generally this is caused by one of the following:

9.1.1. The release cable is too short.

Correct by replacing the release cable with a new one which conforms to the glider manufacturer's specifications.

9.1.2. Poor guidance of the cockpit release tackle - too much friction.

Contact the glider manufacturer - this is a manufacturing fault.

9.1.3. The restoring force is too low because:

- There is friction on the release cable
Correct by cleaning and lubricating the cable in its housing and any pulley bearings.
- The release segment spring is worn out or broken (see 2.7 maximum life-time 10.000 actuations/releases!).
Send the release back to TOST for repairs.

9.1.4. Check installation position.**9.1.5. Check stiffness of fitting and mounting on fuselage.**

10. General Overhaul**10.1. Period between two general overhauls**

The TBO is defined by the life-time of the spring, that means the number of actuations. This life-time is 10.000 actuation. During normal flight operation with 5 actuations per launch that means 2000 take offs. If the release is mainly used for training (with about 8 actuations per launch) the TBO is reduced to 1250 take offs.

In most installations both releases are actuated simultaneously. In this case 1250/2000 takeoffs after the last general overhaul both releases must be returned to the manufacturer:

**TOST GmbH Flugzeuggerätebau
Thalkirchner Str. 62
80337 Munich Germany**

for a general overhaul and service.

Nevertheless, the manufacturer recommends a general overhaul every 4 years because (even if the release is serviced regularly) due to installation position and environmental influences corrosion can occur.

10.2. If the release is installed in another aircraft,

then the number of takeoffs and actuations must be recorded by a qualified inspector in the log of the second aircraft.