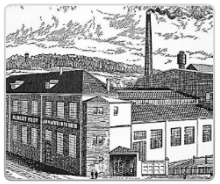
# ELAFLEX

## Aircraft Refuelling Hose Training

# History

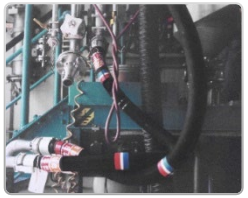


**1913**
Foundation of company Albert HIBY (bronze casting) in Plettenberg: Fire extinguisher fittings and gate valves


**1950**
HIBY production change to petroleum based components, Patent for easy operation petroleum valves

**1954**
Foundation of ELAFLEX - Gummi Ehlers by Karlheinz Ehlers

Start of cooperation with CONTINENTAL (hoses) and HIBY (nozzles)



**1980's**
Development of new types of universal chemical hoses (UTS, EFS)

**1996**
Shareholding of MannTek (DDC Dry Disconnect Couplings)

**1923**
Founded by Karl M.C. Ehlers in Hamburg: Technical Equipment Distributor for navy & shipyards


**1948**
Development of refuelling equipment: e.g. hoses and fittings for aircraft refueling 'Berlin Airlift'

**~1960**
Development / production of ZVA and SLIMLINE petrol pump hoses

Start of cooperation with CONTINENTAL (expansion joints)

**1990's**
Development / production of active vapour recovery system

**1997**
Partnership of ELAFLEX and HIBY: Foundation of ELAFLEX Tankstellen-technik (ETT)

# History

**2000**
Acquisition of distribution and brand rights for PAGUAG hoses (PAL)


**2010**
Reorganization of ELAFLEX Tankstellentechnik (ETT) to ELAFLEX HIBY Tanktechnik (EHT)

Shareholding of Reiflexa (Special Rubber Expansion Joints)

**2016**
Beteiligung an Firma DANTEC (Kompositschlauch Technologie)

**2019**
Shareholding of ALJAC Fuelling Components Ltd. (Aircraft Refuelling Equipment)

**2022**
Shareholding of AIR Traffic Trade (Aircraft Refuelling Equipment)

**2002**
Acquisition of distribution and brand rights for Gossler refuelling equipment

**2010**
Key shareholder of L.G. Equipment ('GasGuard' nozzles)

**2016**
Renaming to ELAFLEX PACIFIC


**2013**
Market launch of ELAPHARM®: Pharmaceutical hoses

**2017**
Shareholding of OASIS Engineering (manufacturer of CNG components)

Expansion of warehouse capacity at Elaflex Hamburg (5800 $m^2$)

**2020**
Merger of Elaflex - Gummi Ehlers and Elaflex Hiby Tanktechnik:
**ELALFLEX HIBY GmbH & Co. KG**

# Profile

- Headquarter: Hamburg, Germany
- Employees: ELAFLEX HIBY Hamburg > 190 (ELAFLEX Group > 670)
- Business Sector: Refuelling Equipment and Rubber Expansion Joints
- Products: Refuelling equipment and safe connections for the transfer of hazardous goods and sensitive fluids: hoses, fittings, couplings, expansion joints and nozzles
- Export ratio: > 70 Percent
- Quality assurance: ISO 9001:2015, AQAP-2130 for NATO supplies
- Distribution: Partners, agents and subsidiaries

# FROM TERMINAL TO NOZZLE

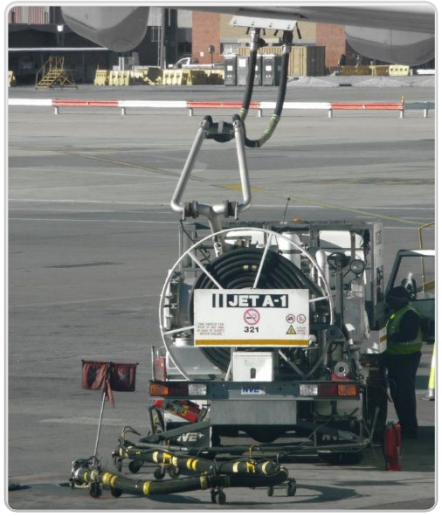
- Production & Construction
- Standards and guidelines
- Hose types
- Electrical Continuity
- End couplings / clamp systems
- Hose accessories
- Overwing nozzle
- Hose handling (optional)

# Production & Construction

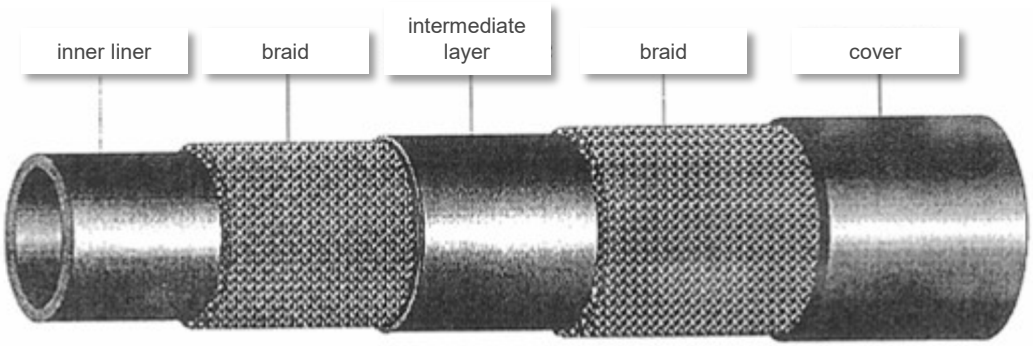
# Production & Construction

Antarctica, **-50 C**
(special low temperature hoses necessary)

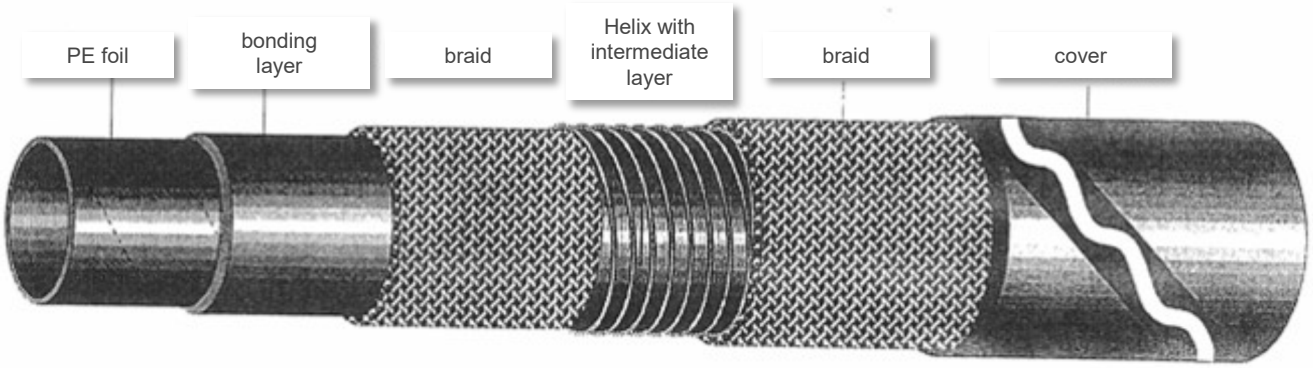
Dubai, **+50 C**




# Production & Construction




## Hoses with PE-liner



# Production & Construction

## The Lining

- The lining is made of NBR rubber
- Protects the carcass against the fuel
- Black anti-static – resistant to all fuels
- Degrades by exposure to UV & ozone
- Should be seamlessly extruded and not lapped to avoid seams to split open and fuel to penetrate

*Visible seams in the lining*

*Seamlessly extruded tube*

# Production & Construction

## The Carcass

- Should be made of quality textile yarns
- Should be braided and not spirally wrapped
- Pressure bearing part, prevents hose from bursting.
- For the best balance between hose flexibility, weight and lifetime

# Production & Construction

## The Cover

- Is made of black electrically conductive chloroprene rubber (CR)
- Protects against outside influences like ozone, water and abrasion
- Should be extruded seamlessly
- The three layers of the hose are bound together by vulcanisation process

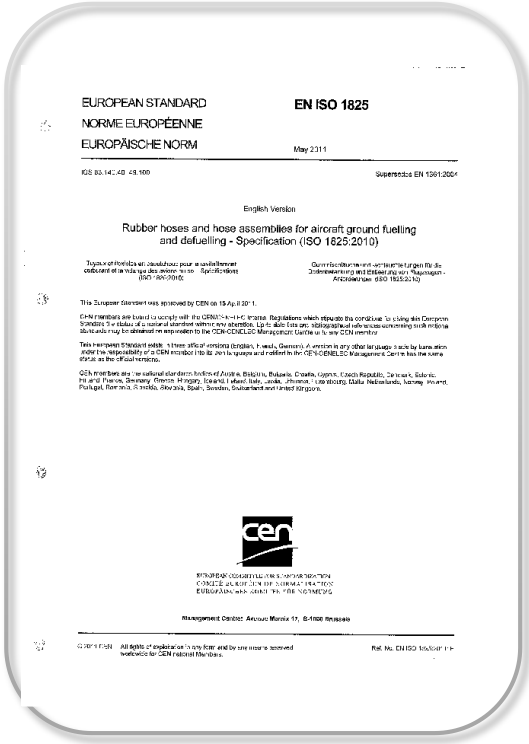

*Ozone cracks due to bad cover quality*

# Standards & Guidelines

- ISO 1825:2017
- EI 1529:2014
- JIG
- ICAO 9977 (Manual on civil aviation jet fuel supply)
- SAE AS 6401 (Storage, handling and distribution of JET fuel at airports)
- ATA 103: Standards for JET fuel control
- Strategic Partner of IATA

# Standards & Guidelines

- Working, test and burst pressure (20 bar / 40 bar / 80 bar)
- Categories of different hose types (B, C, E, F)
- Sizes, measurements, weights, bending radius
- Marking of hoses and couplings
- Electrical resistance of the different types (Ohm / M type)
- Certificates
- Fuel contamination
- Kink resistance
- Temperature range
- Abrasion resistance
- Resistance to aging
- Handling
- And much more…



EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

**EN ISO 1825**

May 2011

English Version

Rubber hoses and hose assemblies for aircraft ground fuelling and defuelling - Specification (ISO 1825:2010)

# Hose types

**Type HD-C**
EN ISO 1825 - type C


hose without metallic conductors but conductive rubber compounds, available with 2 braids…

**Type VHD-C**
EN ISO 1825 - type C


…or 3 braids used as deck hose, reel hose or hydrant intake hose

**Type PHD-F**
EN ISO 1825 - type F


hose with plastic helix and conductive rubber compounds, ideal for high speed de-fuelling

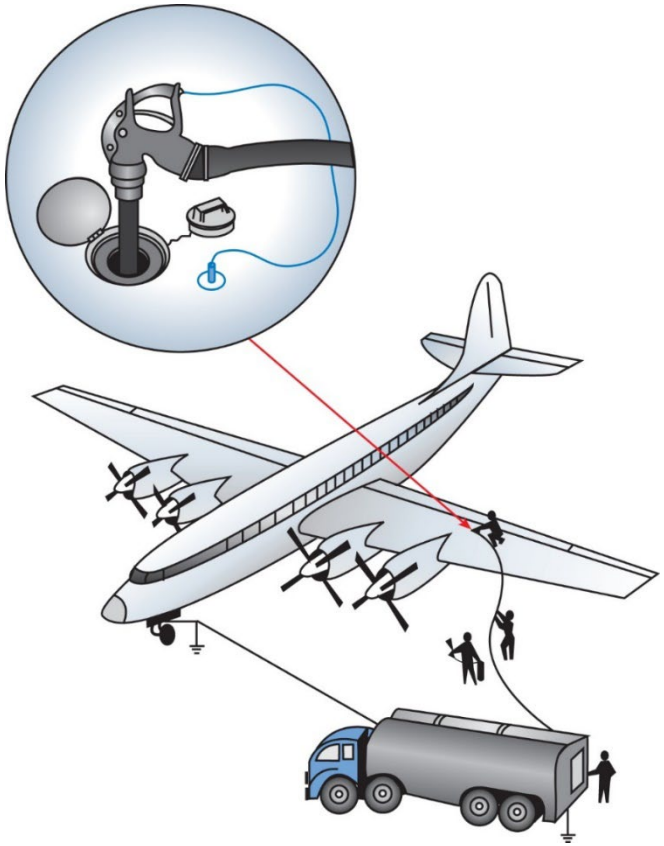
**Type TW-E**
EN ISO 1825 - type E


hose with a strong steel helix used as riser hose (platform), bridger hose (trailer to refueller suction) or on tank farms – (This hose is NOT FOR INTO PLANE APPLICATION)

# Electrical Continuity

Since accident in Kastrup Copenhagen in 1971, major cooperation with MOC's to develop a modern refuelling hose

- No metallic wires etc. allowed for into plane refuelling
- For Ω-hoses resistance between $10^3$ and $10^6$ Ohm
- For M-hoses resistance below $10^2$ Ohm (not allowed for into plane)



# Couplings

**… should be according to EN 14420-ff because…**

- … the correct material is specified
- … they should be forged and not casted
- … they should have a complete marking
- … have to be suitable for the hose
- … and their wetted parts should be free of non ferrous material

# Hose assembly / clamp system

Swaged type

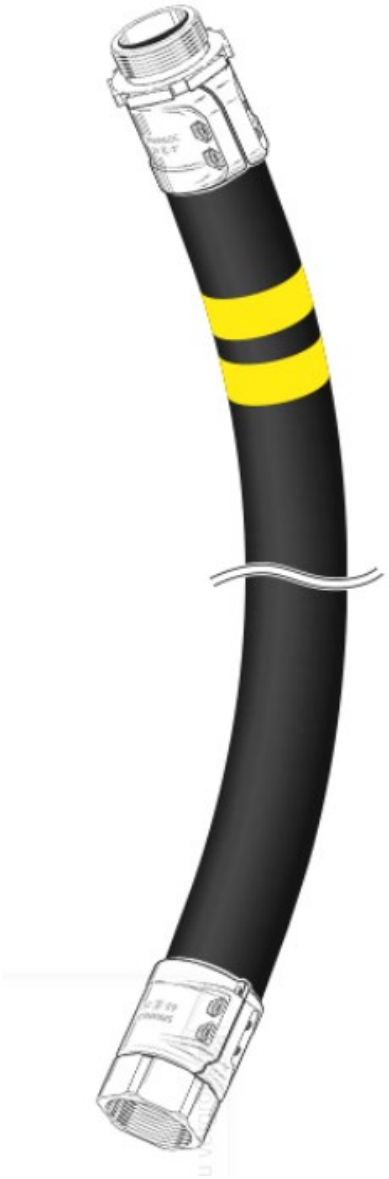
SPANNFIX type

SPANNLOC type

# Hose assembly / clamp system

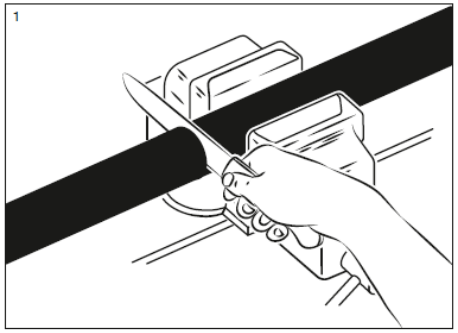
## SPANNLOC type

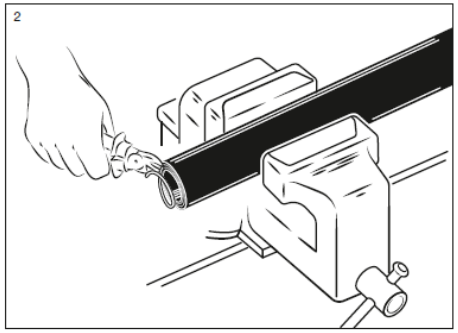
- Most used system all over the world for aviation
- Adjustable
- Re-attachable
- No special tools necessary except a hexagon key

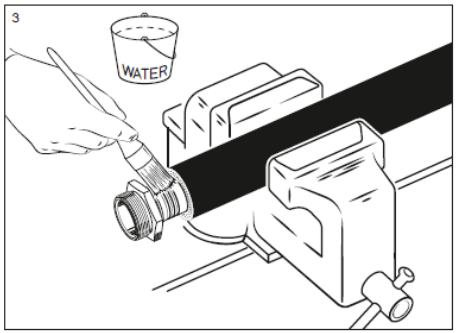


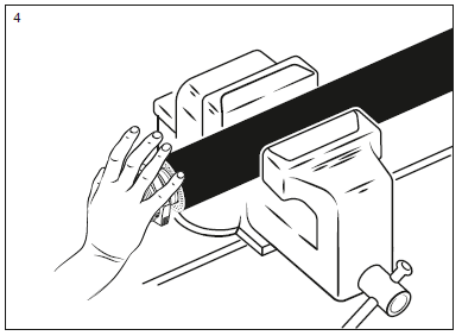
# Hose assembly / clamp system

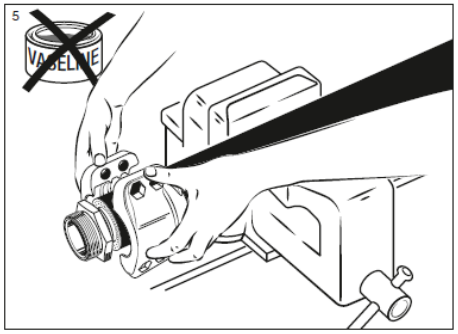
## SPANNLOC assembly instruction

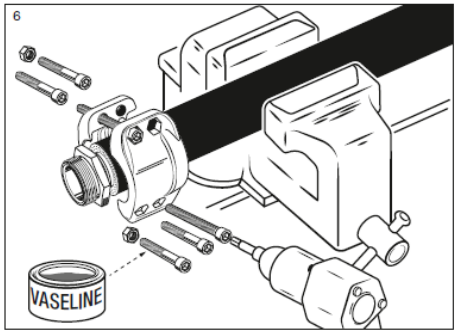


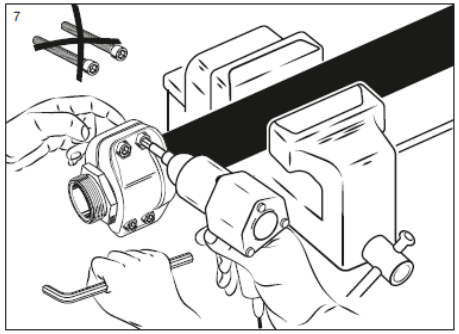



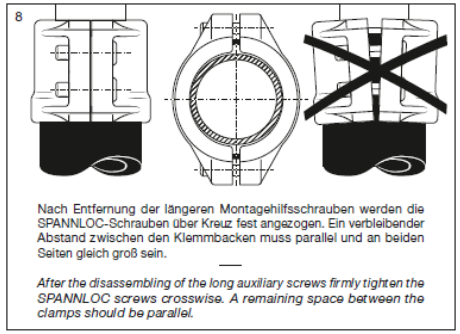



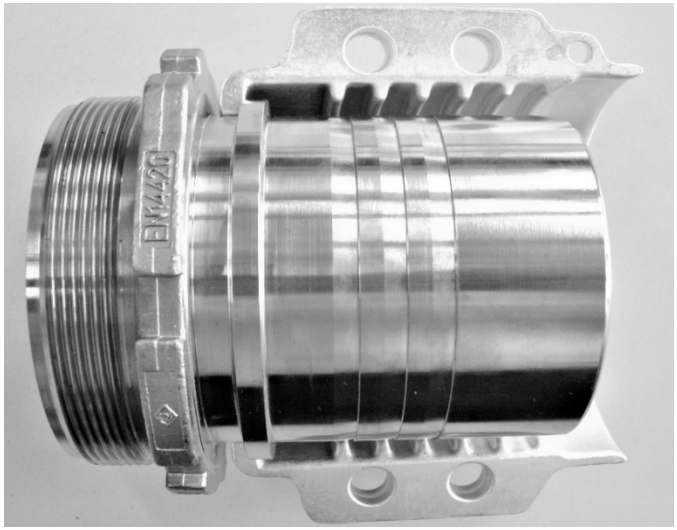



# Hose assembly / clamp system



# Hose assembly / Testing

## Electrical continuity test:

- Hose must be empty !
- Hose should repose for 24 hours after assembly and before testing (pressure and conductivity test)
- Do not touch the non-isolating parts of the device!
- Hose should lay in an U and not like an X !
- Floor should be dry and not conductive !

# Hose assembly / Marking

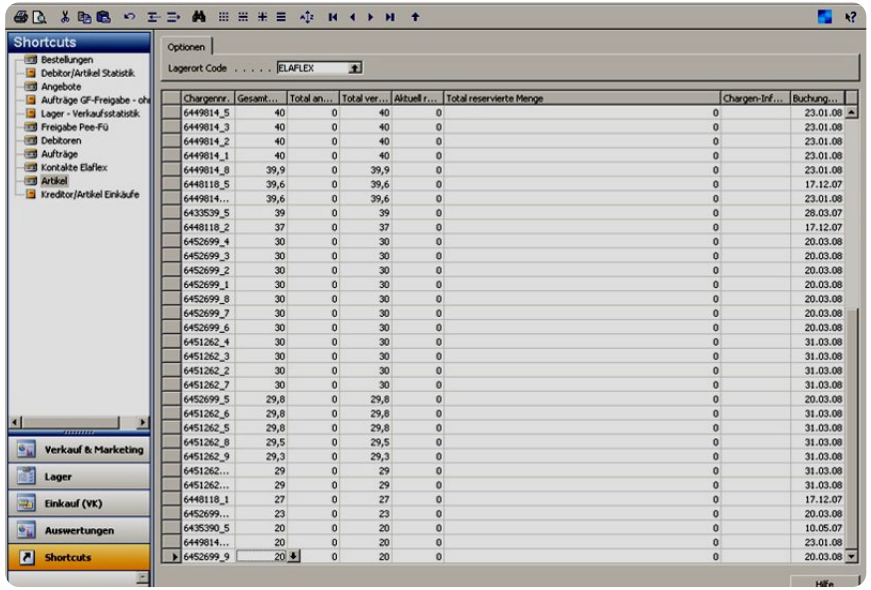
## Permanent marking

**EN ISO 1825 Para O.5 :**
All new fuelling hoses should be coupled by the original manufacturer, a qualified distributor or the user company ONLY AFTER a re-coupling training programme.

The coupling should be durably marked with the couplers name and date of re-coupling.
This process needs to be documented.

# ELAFLEX Service Commitments

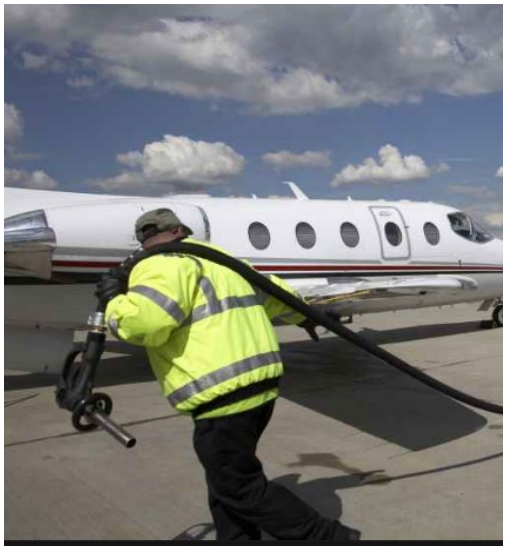
- Tracking of hose assemblies
- Batch number on each hose
- Largest stock of aviation hoses worldwide
- All types of aviation hoses permanently available
- Trained personal for best technical support
- R&D department
- Couplings and hoses according to worldwide valid standards




# Hose Accessories

## General benefits of hose accessories:

- Reduction of dragging force
- Better visibility (i.e. reflection sleeves) can help reduce incidents like being run over by truck or tripped over by personal
- Reduction of hose cover abrasion may result in longer service lifetime



# Hose Accessories

## General concerns of hose accessories:

- It reduces the effectiveness of the very important daily visual inspection (esp. long spiral wraps).
- Often these accessories are not properly attached to the hose and increases the risk of mechanical damages e.g.:
  - small foreign particles unseen between cover and coil
  - scratches due to sharp edges

# Hose Accessories

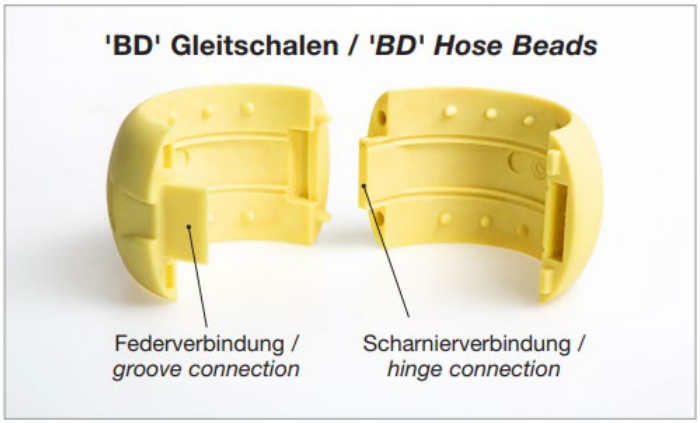
**Main requirements of EI 1522:**

- Compatibility to hose – accessories shall not damage the hose
- No screws, cable ties etc. shall be used, which could fall off
- Confirmation that no incendive discharges could be generated
- Requirement of flame resistance acc. to ISO 1825
- Impact damage resistance (100 times from 2 meters)
- Resistance to weathering/environmental parameters

# Hose Accessories

## Hose beads EI 1522 certified:

*The'BD' Hose Beads to EI 1522 can be easily opened and closed due to their 'Click-Fix-Design', e.g. an advantage at the biannual JIG inspection. Before first hose bead assembling on an existing hose, please check the capacity and dimension of the existing hose reel.*






TÜV NORD Systems

ZERTIFIKAT
CERTIFICATE
Nr.: Z-8120 465 195

**Gleitschalen (Hose Beads) nach EI 1522**
Hose Beads according to EI 1522

| | |
|---|---|
| **Name und Anschrift des Herstellers:/** name and address of bearer/ manufacturer: | **ELAFLEX HIBY GmbH & Co. KG**<br>**Schnackenburgallee 121**<br>**22525 Hamburg** |

Hiermit wird bescheinigt, dass die unten genannten Typen der sog. Gleitschalen als Zubehör von Füllschläuchen zur Betankung von Luftfahrzeugen, erfolgreich einer Typprüfung nach dem Standard des Energy Institute **EI 1522:2019**" unterzogen worden sind. (*unter Berücksichtigung des Nachtrages vom 18.05.2021)
This is to certify that the below mentioned types of Hose Beads as accessories for aviation fuelling hoses have successfully undergone type testing according to the standard EI 1522:2019" of the Energy Institute (*including Addendum 18th of May 2021).

| | |
|---|---|
| Prüfbericht-Nr. / test report No.: | P-8120 465 195-100 |
| Beschreibung der Typen/ description of types: | Gleitschalen als Zubehör von Füllschläuchen zur Betankung von Luftfahrzeugen<br>Hose Beads as accessory for aviation fuelling hoses<br><br>Hose Beads BD<br>Geprüft in den Nennweiten 50 und 63<br>proved in the dimensions 50 and 63 |
| Temperatureinsatzbereich: temperatur range | -30°C bis +65°C |
| Fertigungsstätte/ place of manufacture | ELAFLEX HIBY GmbH & Co.KG<br>Schnackenburgallee 121<br>22525 Hamburg |
| Gültig bis / valid until | 30. Juni 2027 |
| Hinweis / remark: | - |

Hamburg, 06. Juli 2021

TÜV NORD Systems GmbH & Co. KG
Competence Center Elektro- und Tanktechnik
Dipl.-Ing. Bertolt Russnak

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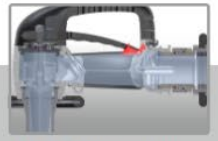
www.tuev-nord.de

# Over wing Nozzle ZVF50

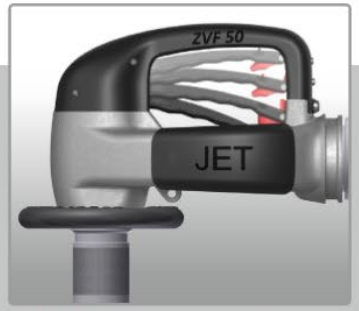

JET, AVGAS or UL: Clear Colour Coding to avoid misfuelling.



High flowrate, low pressure drop.

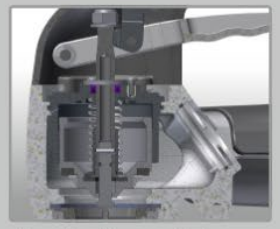
Weight only 2,7 kg.

Ergonomic construction – easy handling.

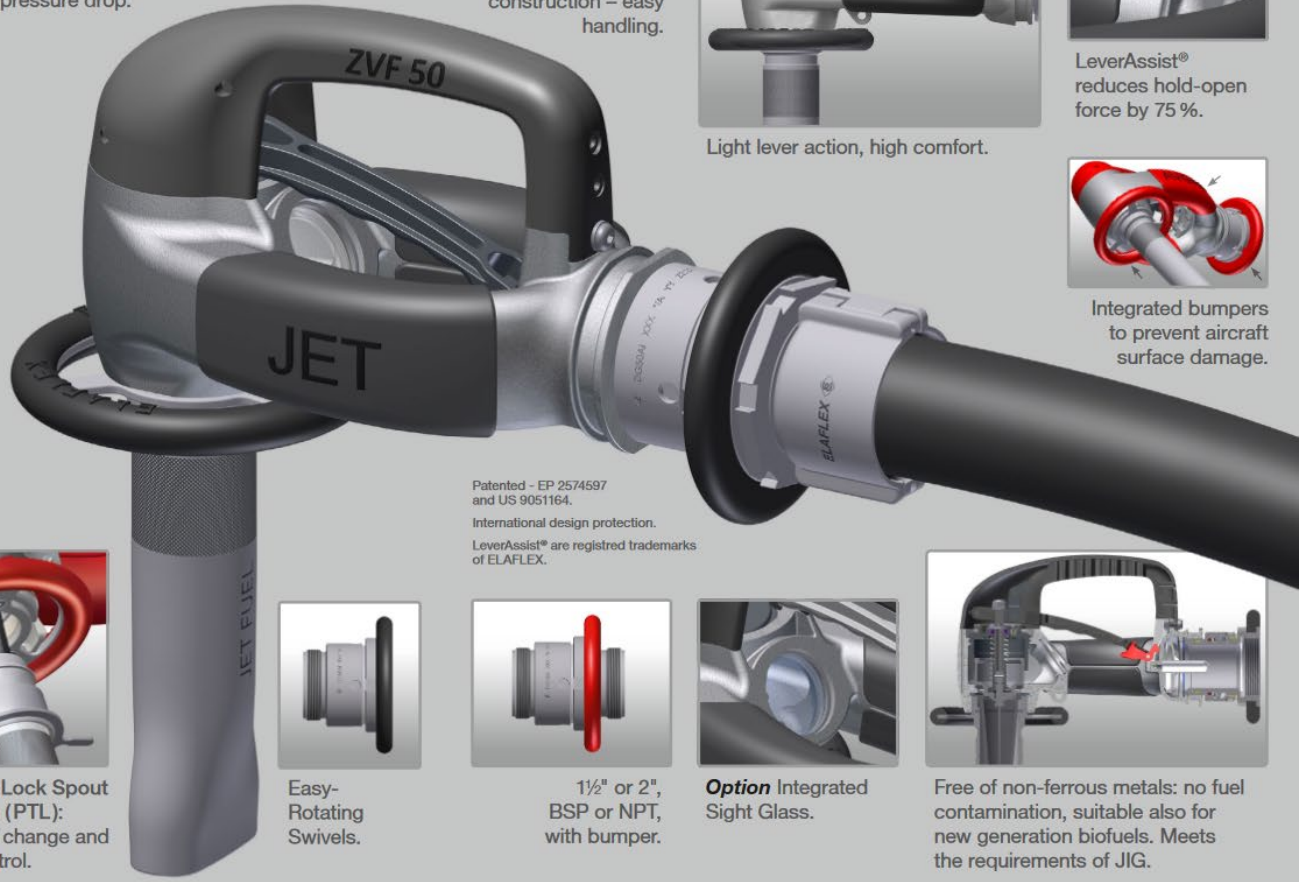



Light lever action, high comfort.

LeverAssist® reduces hold-open force by 75 %.



Sensitive flow control, minimised pressure shock.






Integrated bumpers to prevent aircraft surface damage.

Patented - EP 2574597 and US 9051164.

International design protection.

LeverAssist® are registred trademarks of ELAFLEX.

Screw-In Spout Connection (SIC): no tools necessary, JET spout adjustable.

Push-Twist-Lock Spout Connection (PTL): quick spout change and strainer control.



Easy-Rotating Swivels.



1½" or 2", BSP or NPT, with bumper.



***Option*** Integrated Sight Glass.



Free of non-ferrous metals: no fuel contamination, suitable also for new generation biofuels. Meets the requirements of JIG.

# Hose Handling

**According to JIG hose should receive a daily visual inspection and attention should be paid to:**

- Soft spots, kinks, deformations or blisters
- Excessive abrasion, cracks down to the reinforcements
- Cuts in the hose down to the reinforcements
- Hose has been run over visibly once by any vehicles?

# Hose Handling

**According to JIG hose should receive a monthly inspection:**

- Fully extend the hose and apply full pump or maximum operating pressure with the delivery nozzle or coupling closed.
- While under pressure inspect for external damage, leakage and other signs of weakness. Note: It is not necessary to remove wheel fittings or hose beads but spiral coils
- The inspection of reel hose should be performed by forming a vertical loop and rolling this slowly along the length of the extended hose (under maximum operating pressure)
- Inspect for coupling slippage indicated by misalignment of the hose coupling and exposed areas where slippage had occured

# Hose Handling

**According to JIG a hose pressure test should be carried out every 6 months or when commissioning new hoses**

- Connect fully extended hose to a suitable hydrostatic test pump and fill with appropriate fuel. It is not necessary to remove the hose from the vehicle if suitable isolating valves are provided to protect vehicle components from test pressure (15-20 bar). Remove nozzle prior to testing.
- Gradually apply test pressure and bleed any trapped air from the hose and test equipment. Maintain the maximum pressure for at least 3 minutes to inspect hose for external damage and coupling slippage.
- Release pressure and re-pressurise to 3,5 bar and examine hose as described for the monthly inspection.
- If unfiltered fuel has been used during the test procedure, the hose should be flushed before the vehicle is returned to service. Wear appropriate PPE including eye protection during the whole process!

# Hose Handling

## How to ensure a long life time of hoses and nozzles?

- After refuelling carry back the nozzle to the refueller/dispenser and avoid under all circumstances dragging them over the ground.
- To avoid excessive partical abrasion of high frequently used hoses it is recommended to turn them axially once a year by 90 degrees. Additionally the hose ends nozzle/reel can be changed after 5 years.
- If hose damages close to the coupling area occur it is acceptable (according to JIG) to cut the damaged section and re-attach the couplings by trained and certified staff. It is not necessary to dispose the complete hose lining.
- Kinking of hoses should be avoided. Permanent repeating kinks may damage the internal structure of the hose. Pay attention that hose is not exposed to local excessive abrasion due to vibrations on sharp edges or rough surfaces.

# THANK YOU
# FOR YOUR ATTENTION

**Any questions?**