



# Slurry King Hose Care, Use & Maintenance



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## Contents

### 1. Novaflex Slurry Hose Assembly & Inspection Program

**1.1 Introduction** - This instruction booklet is intended solely for the use of The Novaflex Group customers as a guide for hose Care, Use & Maintenance of Slurry Type Hoses. In all cases readers are instructed to follow local, state and federal guidelines, requirements and law regarding safety and environmental issues. For additional information see Novaflex’s general “Hose Care Use & Maintenance” Booklet.

All customers are expected to follow all prudent safety warnings and instructions throughout the process of inspection, testing, and handling of hose products. This booklet is not intended to cause or promote the selection of a particular hose product or coupling. With respect to the operating of Slurry King Type Hose the reader should rely upon and closely follow the local plant and mandates imposed by regulatory agencies as to the capability and limitations, as well as the proper use of the product (always refer to Novaflex specific product operating information by specification number).

#### 1.2 Slurry King Field Installation

1. Slurry king is a unique robust design hose that permits the installation of the hose on site. This unique field expedient design permits customers to obtain an excellent grade slurry hose without the long lead times associated with custom manufactured slurry hose.
2. Slurry king hose is composed of three elements:
  - a. Slurry King couplings

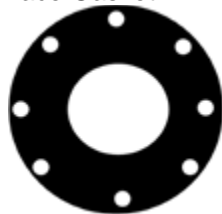
Split Flange Coupling Specifications



- b. Slurry King Hose



- c. Slurry King Full Face Gasket



## 2. Personnel Training Program for Novaflex Hose Coupling

**2.1 Personnel Requirements** - Individuals responsible for the inspection and testing of our hose products must be properly trained and competent. The minimum requirements should include:

- a. Ability to read and write Basic English.
- b. Possess basic math skills so that they can read and understand:
  - i. Instruments
  - ii. Installation procedures / regulations
  - iii. Acceptance charts
  - iv. Labels
  - v. Measuring equipment and coupling data sheets

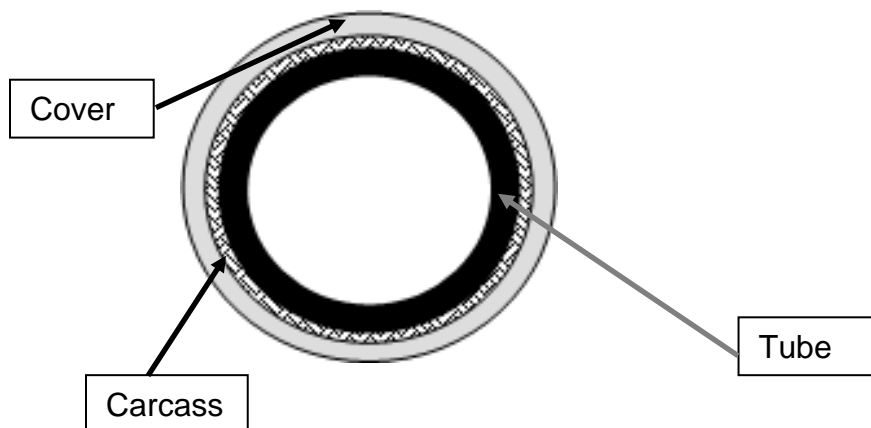
**2.2 Hose Inspection** - Each hose user/assembler is responsible for inspecting hose. Slurry hose is generally considered to be a heavy and robust design. These features also lend the hose to being misused and abused. **It is very important that the hose exterior be physically inspected before each use.** Inspect the assembly in its entirety both internally (as possible) and externally so that it does not present a safety hazard regardless of its ability to withstand pressure. The object of this procedure is to detect any weakness in the structure of a hose assembly before a weakness might cause the failure of the hose in service. It is also important to inspect the hose while in use. While these procedures may apply to any hose, this paper is specifically tailored to Slurry Rubber Hose (either used or new hose). The intent is to prevent the release of the material being conveyed in a hose under pressure that could result in serious injury to personnel, property damage, or pollution to the environment. A Slurry Hose is composed of 3 elements:

### Elements of a Hose

**Tube** — its purpose is to handle the liquid, solid or gaseous material the hose is transferring. The tube is the innermost element of the hose and is intended to be resistant to the product conveyed. Always ensure that the media conveyed in the hose is compatible with the hose tube. See Novaflex's Chemical resistance charts ([www.novaflex.com](http://www.novaflex.com)) or contact Novaflex directly.

**Reinforcement**— its purpose is to withstand the working forces necessary to transfer the product conveyed by the hose tube in the application. Typically this is rated in a maximum rated working pressure (WP) in pounds per square inch (psi/bar).

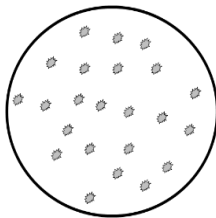
**Cover**— its primary purpose is to protect the tube and reinforcement from external factors such as, abrasion, weather, ozone and external abuse.



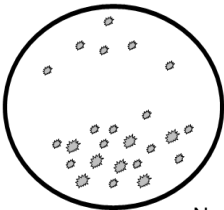
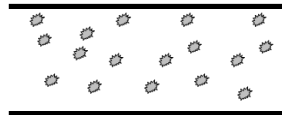
**2.3 Choice of Wear resistant material** - In a hose the choice of the tube compound is dependent on the elements of the application. Rubber compounds for wear protection are typically soft and elastic and thus

display greater wear resistance as compared to the hardest steels. Rubber compounds have the unique ability to absorb the kinetic energy of particle impact by elastically deforming rather than chipping the wear surface. Optimum wear mechanical properties of rubber typically have a hardness range of 35 to 65 Shore A Durometer. Novaflex has a menu of compounds, uniquely formulated to handle the variables of abrasion, cutting, ripping etc.

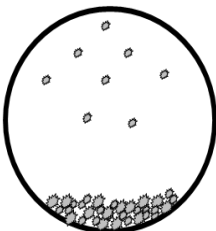
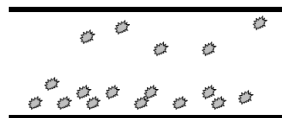
**2.4 Hose Internal Wear** - Material transfer by hose often plays an important role in a manufacturing process. Often a flexible hose is used to carry materials as a slurry (liquid mixed with materials) or dry material in a pneumatic application (material blown with air). These forms of material transfer are used in lieu of rigid, heavy and hard to install steel or plastic piping. To avoid sedimentation it is necessary to keep the mixture flowing or turbulent. Deposit on the bottom of the conveying hose or pipe reduces efficiency and can cause clogging or blockages. Depending upon the proportion of liquid vs material, as well as the flow rate, the material may be carried along in one of the ways described below:



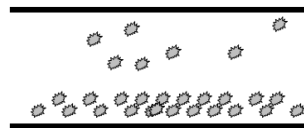
Uniform flow of heterogeneous material



Non-uniform flow—larger particles bounce along the bottom



Non-uniform flow—with stationary or sliding bed of material



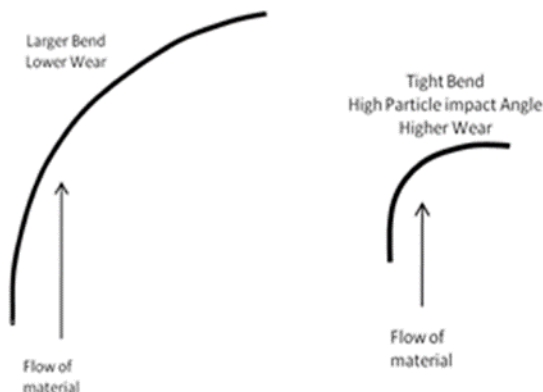
#### Causes of wear

Abrasion is the wear or undesirable removal of material from the surface of the conveying product. The degree of wear or abrasion varies widely and is determined by the following factors:

- A. Material Transferred—Size, Sharpness, Size, Distribution, Hardness
- B. Velocity—flow rate
- C. Turbulence
- D. Angle of material impact— effected by bend radius
- E. Slurry or Dry
- F. Contamination elements— presence of oil or chemicals (PH value of slurry liquid)
- G. Temperature

Novaflex has designed many variations of tube compounds to resist the effects of abrasion based on the specific factors common to the application being engineered. Flexible material transfer hoses are typically placed in applications that require flexibility to overcome bends, offsets, misalignments, expansion or contraction and vibration. Applications with bends present the most difficult wear applications. It is important to note that the larger the bend radius that can be engineered into a wear application, the greater the service life of the hose. Since hose wear is always on the outside radius of the hose bend, the greater the bend the lower the angle of impact and thus the lower the wear. The optimum bend radius to maximize wear is 10 times the ID, Novaflex hoses have much tighter bend radiuses published, but larger bend radiuses offers longer service life potential.

**Hose tube depicting particle impact with different bends**



To increase the service life of hose used in a bend, it is recommended that the hose be rotated around it's axis so that the wear is more evenly distributed.

The selection of a hose tube for a specific application is a cost benefit relationship. Often there may be several compounds that can meet an application. The hose can have increased thickness tubes to provide added life. Everything has a cost associated with the hose, cost of product, hose service life and cost to uninstall and install (plant down time). In many applications the media is constant, but in some the media transferred changes radically. It is always best to evaluate the product in a consistent environment, measuring tonnage processed is one of the more valid approaches. On new or unmonitored applications, it make be necessary to evaluate several versions to obtain the most cost efficient product for the application. Novaflex will work with customers to develop the best hose for the application.

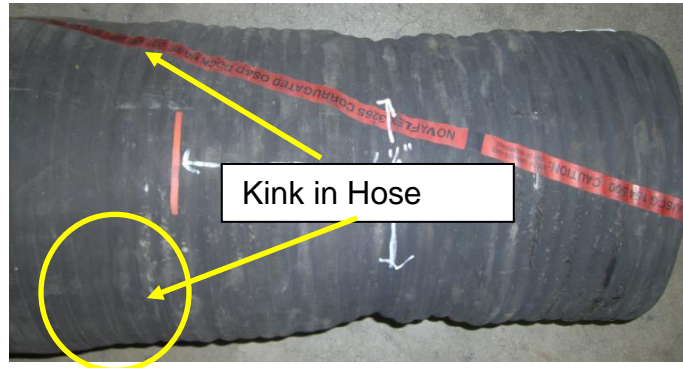
**2.5 Slurry Rubber Hose** - The rubber Slurry Hose inspection procedure consists of four main elements (some of the elements are more applicable to hose that has previously been in service).

**2.5.1 External inspection (no pressure)**

The external portion of the hose or its "cover" serves the primary function of protecting the reinforcement members of the hose from physical or chemical damage. The cover should be carefully examined in order to detect areas where possible reinforcement damage may have occurred.

Any cuts, abraded areas, cracks in the cover that result in exposing the reinforcement, whether it be wire or textile, must result in the hose being rejected (minor cover damage can be repaired by an qualified person so long as the damage does not go through layers of the reinforcement). It must be remembered that the rubber hose covers may show signs of surface cracking due to prolonged exposure to sunlight, ozone, and/or chemicals, but this by itself does not require the hose to be removed from service unless it completely penetrates the cover down to the hose reinforcement. Exposed reinforcement will weaken textiles and rust wire causing hose failure.

If in the event a used hose has become extremely soft or has visible stress areas behind the coupling stem evident on the cover, this is cause for removal from service. Some used hoses may display bubbles\* in the cover or loose spots under the cover. This phenomenon requires the hose be retired from service. If a hose is kinked (kink is where the hose is dented greater than 20% of its diameter) or mashed flat, this hose must be removed from service. If a hose has a kink less than 20% of its diameter the hose can be used to finish the day's operation process and then removed from service (the kinked area restricts flow and will result in the hose ID or tube to wear quickly).



### 2.5.2 Internal Inspection

This inspection mainly applies to used product (when possible) but should be performed on all hoses during the coupling process. The internal inspection must be performed through the use of back lighting or a flashlight shown down through the tube. Observe as much of the inside diameter of the hose as possible. Where this is not practical because of extremely long lengths, the end of the hose inspected must be considered representative of the entire length. (This would not be the case if there is evidenced and/or loose covers on the outside of the hose previously noted during the external inspection. In this case, cut out loose spots and check the hose tube again in this area.)

Cause for rejection of hose during the internal inspection is usually a result of the tube being subjected to product it was not designed to handle. The following phenomena if observed must result in the entire hose length being retired from service.



- Loose tube – looking in from coupling



- Cracks in the tube
- Soft or gummy texture of the tube
- Blisters in the tube



- Tube scared or worn excessively

### 2.5.3 Coupling Inspection

Each style of fitting must be inspected based upon its own merits and requirements. This process involves the wiping of the inside of the coupling and the outside of the coupling with a rag prior to inspecting.\* If the following phenomena if observed requires that the fitting be rejected and removed from the hose and serviced.

- Any worn parts that prevent the fitting from performing its designed function.
- Damage to any safety devices, which result in them not working correctly.
- Threads worn or damaged
- Excessive corrosion or rust
- Any cracks observed in any part of the fitting
- Flange face damage – scratched or nicked

Used hose must be inspected closely in the area just behind the fitting to make sure there is no evidence of stress on the hose was caused by pulling and/or hanging of the hose against the coupling shank. If this is observed the hose must be removed from service.

Kink in Hose at end of coupling



Hose flattened/kinked



All couplings must be inspected for evidence of coupling movement. If movement has taken place there will be marks or scuffed areas just behind the coupling ferrule. If this is observed, the hose must be removed from service.

#### 2.5.4 Slurry King Hose

Slurry King hose is produced in long lengths and as such comes in 3 standard configurations:

Red tube – NovaWear– RG, Non-conductive – Very abrasive resistant

Tan Tube – NovaWear- TG, Non-conductive – Very abrasive resistant

Yellow Tube - NovaWear- YG, Non-conductive – Ultra abrasive resistant

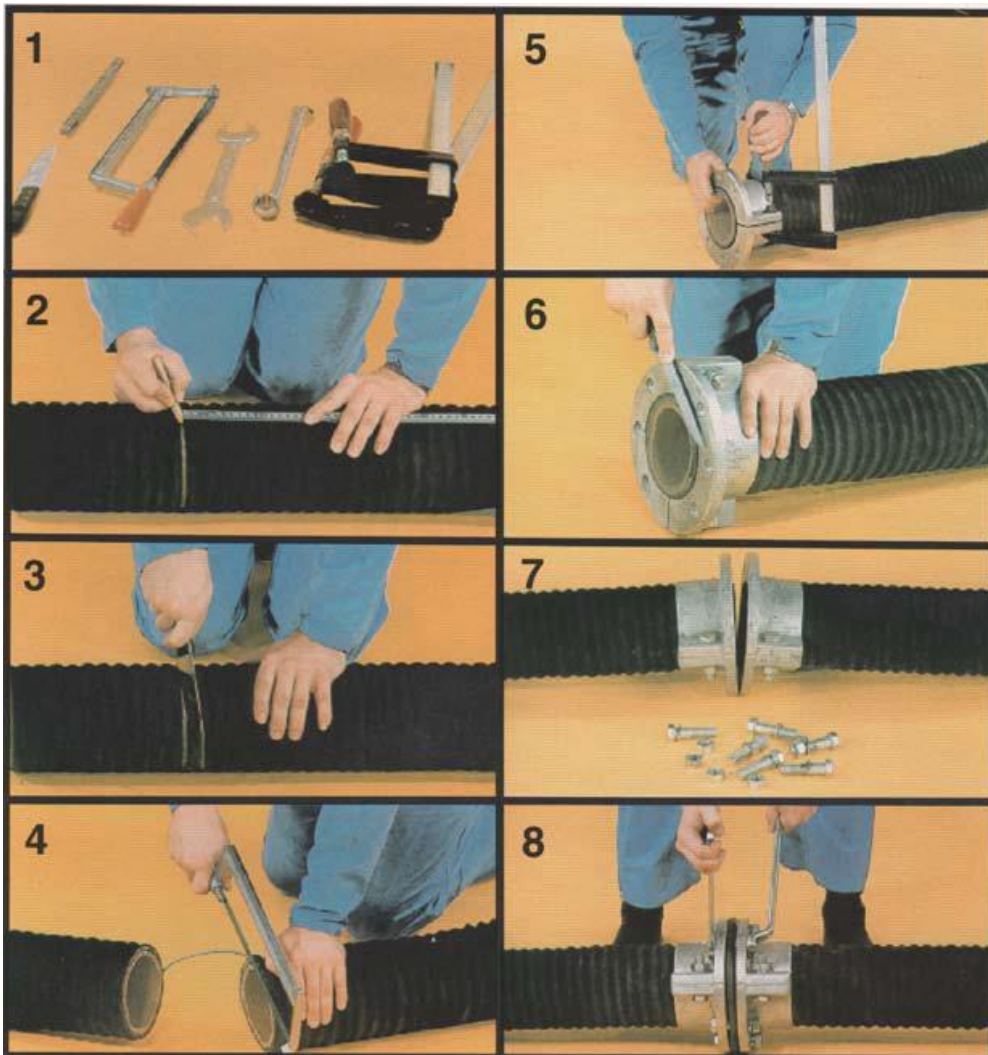
**(Should a conductive hose be required a special conductive tube can be used in the construction of the hose).**

Slurry King is rated at 150 PSI working pressure in all sizes. Typically slurry systems operate at much lower pressures (25 to 75 psi). Slurry King is unique in that it can be field assembled using special external couplings that are designed to grasp the external surface of the hose OD. Only Novaflex approved couplings should be used on Slurry King. **It is important to note that the rated working pressure of the hose should never be exceeded for any reason! This includes pump surges, start-up surges and any other pressure inducing situations.**

**When assembling Slurry king all assemblers must wear appropriate Personal Protective Equipment. (i.e. protective clothing, gloves, hard hat, eye protection, safety shoes, etc.)**



## Slurry King Assembly



1. Tools required: Measuring tape, chalk, knife, hacksaw, clamps and wrenches.
2. Measure and mark the required length of hose. Add a little extra length for trimming (see photo) and lateral overlap.
3. Cut off the marked length of hose plus the extra length, using a sharp wet cutting tool, such as a knife.
4. Pull the cut surfaces apart so that the steel helix can be pulled out of the rubber. Cut off the steel helix. Placed the two halves of Slurry King hose coupling parts 1 and 2 at the position marked and clamp together. Insure that the serrations in the coupling mate with the cover serrations.
5. Bolt the two halves of the coupling through the

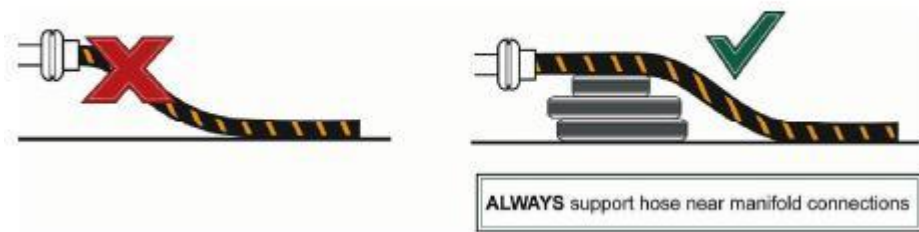
- joining flanges. Tighten the bolts alternately to distribute the pressure and tightening torque evenly around the hose. Use suitable force to tighten, excessive tightening can damage hose or coupling. The end of the hose should extend about  $\frac{1}{8}$ " beyond the coupling flange.
6. Installation is complete when corrugated deformations become clearly visible in the bore of the hose.
7. Place a sealing gasket between the two couplings and bolt the coupling flanges together. The hose should be attached to a supporting structure over its entire length, but particularly in the area of bends.

3. **Hose Handling** – This section is a guideline presented to assist the customer in obtaining maximum service life. Every installation has different requirements and different equipment to handle Hose. Below are basic suggestions to facilitate hose handling. It is important that the hose be installed to be in a bend radius larger than its minimum bend radius of the hose by ID.

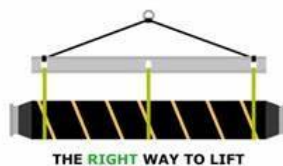
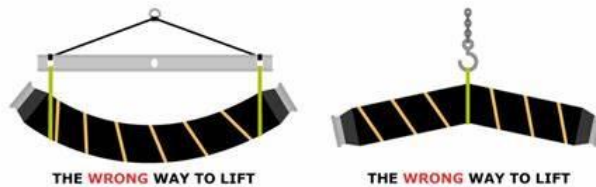
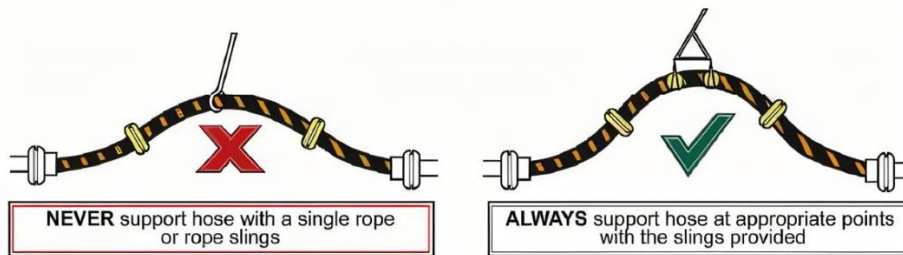
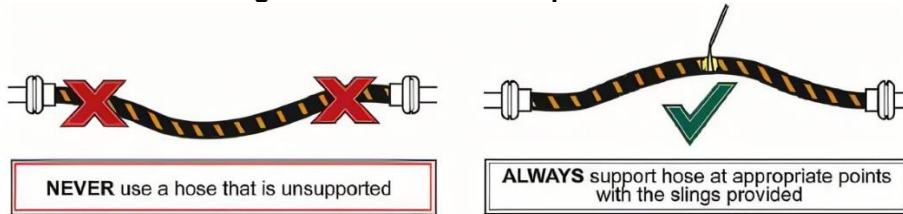
Each hose should be only be used to transfer the media listed in the Novaflex Chemical Resistance Charts and at the pressures and temperatures listed on the hose label. If a chemical is not found contact Novaflex or check [www.novaflex.com](http://www.novaflex.com).

**It should be noted that when hoses are used in straight lengths they are subject to elongation. It is important to allow room for this longitudinal expansion or movement that can occur under pressure. Slurry King is a robust hose and can expand up to 3% under pressure.**

a. Typical correct & incorrect handling situations/installations

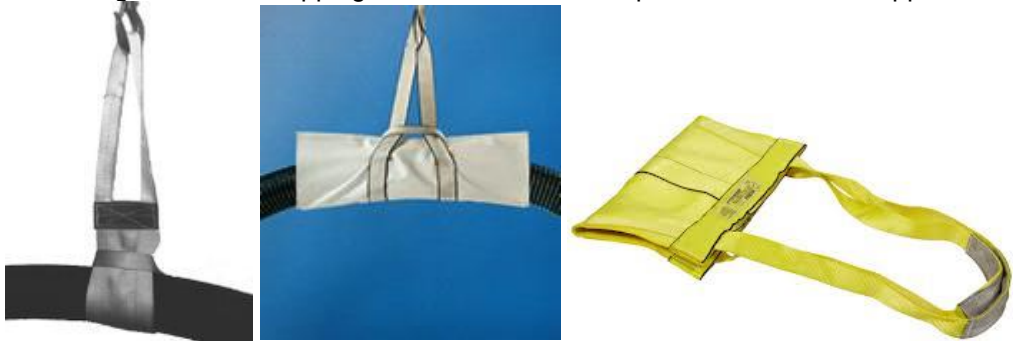


Extra hose length to accommodate expansion.



b. Novaflex recommends the use of lifting slings (min. 12" wide), lifting buns and/or cradles designed to reduce stress and kinking when lifting hoses.

i. Hose slings – woven strapping that included a center portion with a wide support area.



ii. Hose buns are excellent for listing and provides superior support to the hose.



iii. Hose dollies – for moving hoses on a hard surface

