7.0 - Mechanical Considerations

7.1 Determine the weight of the load. The weight of the load shall be within the rated capacity of the sling.

7.2 Select a sling having suitable characteristics for the type of load, hitch and environment.

7.3 Slings shall not be loaded in excess of the rated capacity. Consideration shall be given to angle of lift which may affect the lifting capacity. Diameters of pins and edges also may affect the capacity of the lifting sling.

7.4 Slings used in a choker shall not be forced to tighten around the load by pounding with hammers or other objects. Choker hitches are the least effective way to use a sling based on capacity. Two chokers should be used to balance the load. One choker in the center of the load may create an unbalanced situation which could lead to an accident.

7.5 Slings used in a basket hitch must have the load balanced to prevent slippage and accidents.

7.6 Slings used with fittings shall be compatible with the fittings used. The lifting capacity shall be rated at the lower of the fitting or sling. Fitting openings shall be of the proper shape and size to assure that the sling will seat properly.

7.7 Slings shall be protected from cutting and edges. All protrusions and abrasive surfaces will be kept from contact with the sling. Where unavoidable situations develop padding shall be placed between the sling and the load. The pin area of a shackle can cause synthetic slings to cut and placing synthetic slings on the pin should be avoided unless it is protected.

7.8 Slings shall not be dragged on the floor or drawn across other surfaces which may damage the sling.

7.9 Slings shall not be twisted or tied in knots to shorten.

7.10 Slings shall not be pulled from under loads resting on the sling.

7.11 Do not drop objects on slings or run over them with vehicles.

7.12 Slings which are damaged shall not be used.

7.13 Sling hitches must provide control of the load.

7.14 Portions of the human body shall be kept from between the sling and the load and from between the sling and any attachment to lifting devices such as hooks.

7.15 Personnel shall stand clear of suspended loads.

7.16 Personnel shall not ride on the sling or suspended loads.

7.17 Avoid snatch or shock loading.

7.18 Twisting and kinking the legs of the sling shall be avoided.

7.19 Load applied to the hook should be centered in the bowl of the hooks. Do not point load the hook.

7.20 During lifting with or without the load all personnel shall be alert for possible snagging.

7.21 The slings should contain or support the load from the sides above the center of gravity so that the load will not tilt when the load is lifted.

7.22 Slings shall be of the proper length so that the angle of the sling to the load does not reduce the rated capacity of the sling for a given angle.

7.23 Only legibly marked or labeled slings must be used. If the tag is not legible, or missing, the sling must not be used.

7.24 Keep labels or tags away from the load, the hook and the angle of choke.

7.25 Synthetic slings should be inspected each time before each lift.

8.0 - Environmental Considerations

8.1 When not in use, synthetic slings should be stored in a clean dry place. Heat sources and non-ventilated places should be avoided.

8.2 Chemically active environments can affect the strength of synthetic lifting slings. Different chemicals will react with different exposure to Covermax® bulked nylon, polyester, aramids, and Olefins.

Aramids are resistant to most ketones, alcohols, dry cleaning solvents and many other organic solvents. Its acid resistance is superior to that of nylon but is not as good as that of polyester. Aramids show good resistance to alkalis at room temperature, but is degraded by strong alkalis at higher temperatures.

Aramids are compatible with fluorine-containing elastomers, resins, and refrigerants at high temperatures, and is resistant to fluorine compounds in concentrations usually encountered in stack gases from metallurgical and rock-processing operations.

The resistance of aramids to oxides of sulphur at temperatures above the acid dew point is superior to that of polyester. Below the dew point, concentrated sulphuric acid may condense on the fiber and cause a progressive loss in strength.

In moderate to strong acid or alkali environments, evaluation of aramids should be made to ensure that

the yarn will perform acceptably before use.

Polyester and nylon are not significantly affected by most compounds of the following classes: Alcohols, Dry Cleaning Solvents, Halogenated Hydrocarbons, Ketones, Soaps and Synthetic Detergents, and Water (Including Sea Water).

Polyester also shows good to excellent resistance to:

- Aqueous solutions of most weak acids at the boil, and to most strong acids at room temperature,but is disintegrated by concentrated (95%) sulphuric acid at room temperature.
- Aqueous solutions of strong alkalis at room temperature, but is degraded at the boil.
- Oxidizing agents, and is not degraded by bleaching treatments ordinarily used for textiles.

Nylon is not significantly affected by most aldehydes, alkalis, ethers, or hydrocarbons, but is deteriorated by dilute acids (e.g., hydrochloric acid and sulphuric acid in 10% concentrations at room temperature cause a noticeable loss in breaking strength in 10 hours).

Solvents for nylon includes: Concentrated formic acid, Phenolic compounds at room temperature, Calcium chloride in methanol at room temperature.

Hot solutions of calcium chloride in: Glacial Acetic Acid, Ethylene Chlorohydrin, Ethylene Glycol.

Hot solutions of zinc chloride in methanol Benzyl alcohol at the boil.

Aramids are resistant to most weak acids and alkalis, ketones, alcohols, hydrocarbons, oils and dry cleaning solvents. Strong acids and bases and sodium hypo-chlorite bleach attack aramids, particularly at high temperatures of high concentrations.

K-Spec® core yarn strength retention is based on test results of components at 65°C/150°F (or less) for 6 months. K-Spec® has a 100% strength retention when exposed to: Age, 10% detergent solution, rot and mildew, sunlight and Toluene; 99% strength retention when exposed to: acetic acid, gasoline, hydrochloric acid 1m, hydraulic fluid, kerosene, and sea water; 98% retention when exposed to: 25% ammonium hydroxide, 10% hypophosphite solution, and 40% phosphoric acid; 97% retention when exposed to 5m sodium hydroxide; 95% retention when exposed to Portland cement and sulfuric acid; and 88% retention when exposed to Clorox®, and nitric acid. polyethylene,

9.0 - Fiber Characteristics

(Using Nylon as a basis of 1.0)

Generic Fiber Type	Nylon	Polyester	Polypro-Pylene	HDPE Olefin	Aramid	K-Spec®
Bulk Strength[1]	1.0	.9 - 1.1	.55	2.8	2.7	2.75
Weight	1.0	1.21	.80	.85	1.26	1.01
Working[2] Elastic Elongation	1.0	.60	.80	.10	.10	.10
Co-efficient[3] of Friction	.10 -.12	.12 - .15	.15 - .22	.08	.10 - .12	.10
Melting Point	460°F	480°F	330°F	297°F	Chars at 800°F	Chars at 297°F
Critical[4] Temperature	180°F	180°F	180°F	150°F	300°F	180°F
Specific Gravity	1.14	1.38	.91	.97	1.44	1.2
Cold-Flow (Creep)[5]	Negligible	Negligible	Negligible to High	Negligible to High	Negligible	Negligible

[1]Bulk Strength is defined as strength per circumference squared.

[2]Working is defined as rope actually in use under a cycling load.

[3]Co-efficient of friction is based on reluctance to slip or slide.

[4]Critical temperature is defined as the point at which degradation is caused by temperature alone.

[5]Cold-Flow (Creep) is defined as fiber deformation (elongation) due to molecular slippage under a constant steady static loading situation. Fibers that have this inherent characteristic will display extremely low or negligible creep if minor fluctuations occur in the rate and/or frequency of load levels. In rope form, this would apply to polypropylene, polyethylene, and HDPE Olefin fibers.

10.0 - Inspections of Twin-Path® Products

10.1 Tell-Tails should extend past the tag area of each sling. If both Tell-Tails are not visible, remove the sling from service. If any part of the sling shows evidence of chemical degradation, remove it from service. Send to manufacturer for repair evaluation.

10.2 Slings should be inspected for evidence of cutting or tearing of the outer cover. Slings with cuts should be removed from service and sent back to the manufacturer for repair evaluation. Damage to the cover may indicate core damage.

10.3 Inspect slings for evidence of heat damage. Aramid Sparkeater Slings should not be exposed to temperatures over 149°C/300°F. K-Spec® and Polyester Core Slings should not be exposed to temperatures above 82°C/180°F. Cold temperature exposure down to minus 40°C/minus 40°F do not effect the strength of the products. Other temperatures should be referred to the manufacturer.

10.4 Slings using aluminum fittings shall not be used where fumes, vapors, sprays, or mists of alkalis or acids are present.

10.5 Twin-Path® Lifting Slings and any fittings attached should be the subject of frequent and regular inspections. In addition to the initial inspection by a competent person and frequent written inspections, the slings should be visually inspected before each use.

10.6 Written inspections should be performed as required and documents of such inspection by a competent person shall be kept on file in the safety department of the plant or site where used. Inspections may be done more often based on frequency of use, severity of conditions, experience of past service life.

10.7 Slings should be examined throughout their length for abrasion, cuts, heat damage, fitting distortion or damage, tag legibility, and if any doubts are held by the inspector, the sling should be removed from service. Core integrity is determined by fiber optic light transfer if this type of tell-tail is installed in the sling. If a deterioration is found, the sling must be removed from service and returned to the manufacturer for evaluation.

10.8 Slings removed from service that are not capable of repair should be destroyed and rendered completely unfit for future use.

10.9 Abrasion, heat damage or cuts to the cover may indicate a loss of strength to the load core and these slings should not be used until evaluated by the manufacturer. At area of damage, cover should be opened and the core yarns counted and visually inspected.

11.0 - Test Procedures for Complete Twin-Path® Sling Products

11.1 For proof testing, the pins shall be 1˝ diameter or larger.

11.2 Proof tests shall consist of pulling the slings to twice their rated capacity. Slings shall be held at the proof test limit for a minimum of 15 seconds and then the tension may be released.

11.3 Testing of Twin-Path® Sling products and load yarn shall be on a testing machine, which meets or exceed the standards as described in ASME E-4.

11.4 Break testing of slings shall be as above with results documented. Pin size for break testing should be a diameter equal to half the nominal sling width, or larger.

11.5 Proof testing is mandatory for every newly manufactured and repaired Twin-Path® sling.

11.6 After the sling is proof tested, the Tell-Tails should then be trimmed to length prior to shipment.

11.7 Repaired fittings or slings shall be proof-tested before they are returned to service.

THESE RECOMMENDED STANDARD SPECIFICATIONS HAVE BEEN FORMULATED AS A GUIDE TO USERS, INDUSTRY AND GOVERNMENT TO INSURE THE PROPER USE, MAINTENANCE AND INSPECTION OF TWIN-PATH® LIFTING SLING PRODUCTS.