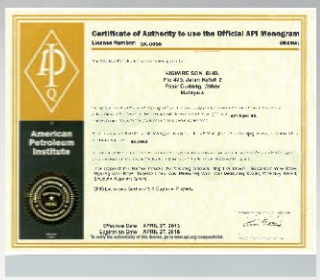
Neptune®
N2 Hyrope®

OFFSHORE ROPES

Wire Rope Management Guide

Quality Assurance



ISO 9001 Det Norske Veritas Management System

API Certificate of Approval to use the official API Monogram

Korean Register Approval Certificate for Manufacturing Process

ABS Certificate of Manufacturing Assessment

ABS Certificate of Design Assessment

ABS Certificate of Type Approval (AQS)

Det Norske Veritas Approval of Manufacturer Certificate

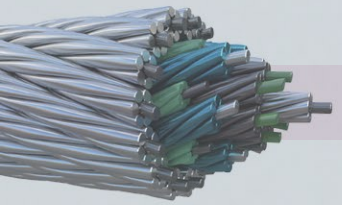
CCS Certificate of Works Approval

LR Approval of a Works for the Manufacturer of Steel Wire Rop

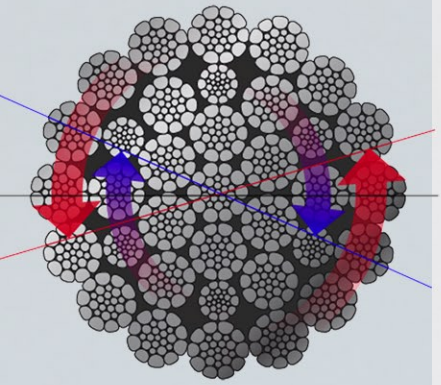
KISWIRE is committed to supplying the highest possible quality across its full product range.
This is achieved by strict adherence to ISO 9001 to which the whole of KISWIRE's operations are accredited.

KISWIRE maintains its QA programmes throughout its operations to ensure that products are manufactured under a documented and controlled system for consistency in workmanship standard.

CONTENTS

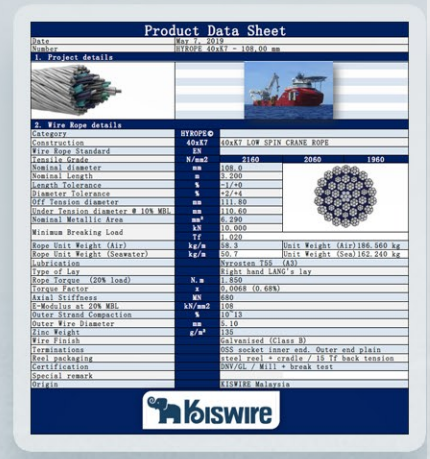


A wire rope management system covering the purchase of the right type and quality wire rope as well as the optimization of its performance and service life.



1.1 Right rope for the application

A survey of the device the rope shall be deployed on can tell us what specifications the wire rope shall comply with.
We are at customers disposal to assist specifying the right wire rope for the application.



Product Data Sheet

Date	May 7, 2019		
Number	HYROPE 40xK7 - 108.00 mm		
1. Project details			
2. Wire Rope details			
Category	HYROPE®		
Construction	40xK7	40xK7 LOW SPIN CRANE ROPE	
Wire Rope Standard	EN		
Tensile Grade	N/mm2	2160 2060 1960	
Nominal diameter	mm	108.0	
Nominal Length	m	3.200	
Length Tolerance	%	-1/+0	
Diameter Tolerance	%	+2/+4	
Off Tension diameter	mm	111.80	
Under Tension diameter @ 10% MBL	mm	110.60	
Nominal Metallic Area	mm²	6.290	
Minimum Breaking Load	kN	10.000	
	Tf	1.020	
Rope Unit Weight (Air)	kg/m	58.3	Unit Weight (Air)186.560 kg
Rope Unit Weight (Seawater)	kg/m	50.7	Unit Weight (Sea)162.240 kg
Lubrication		Tyrosten TSS (A3)	
Type of Lay		Right hand LANG z lay	
Rope Torque (20% load)	N.m	1.850	
Torque factor	k	0.0068 (0.68%)	
Axial Stiffness	MN	680	
E-Modulus at 20% MBL	kN/mm2	108	
Outer Strand Compaction	%	10.13	
Outer Wire Diameter	mm	5.10	
Zinc Weight	g/m²	135	
Wire Finish		Galvanised (Class B)	
Terminations		OSS socket inner end, Outer end plain	
Reel packaging		steel reel + cradle / 15 Tf back tension	
Certification		DNV/GL / Mill + break test	
Special remark			
Origin		KISWIRE Malaysia	

Kiswire

1.2 Determining wire rope specification

Then the detailed wire rope specifications can be composed (see attached Product Data Sheet for guidance)
This Product Data Sheet can be used as a checklist to set out the correct wire rope specifications as well. It makes sure that no items are missed out.

1.3 Verification of PO versus Production Order

In consent with the wire rope producer the producer of the rope confirms to manufacture the rope in compliance with the specifications upon which a PO can be exchanged.

DNV

DET NORSKE VERITAS

APPROVAL OF MANUFACTURER CERTIFICATE

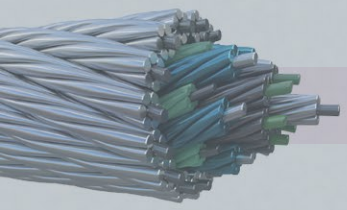
Kiswire SDN. BHD.

Pasir Gudang, Johor 81700, Malaysia

Steel Wire Ropes

1.4 Quality certified

Often a third party Classification Bureau Certificate is agreed to be supplied with the rope, along with the producers own MILL certificate, containing all details of all component material used for the manufacturing of the rope, guaranteeing amongst others the traceability of the material.



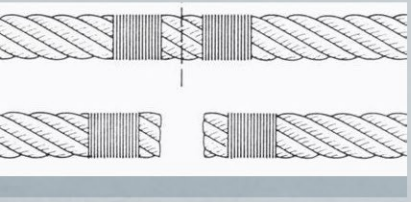
1.5 How to store the rope

Once the specified wire rope is delivered one shall store the rope inside a warehouse and preferably not expose the rope to sun, rain, snow and frost. Best to store the wire rope at a constant temperature of, say between 5 to 20 degrees Celsius.

1.6 Safety first

If a wire rope has been in storage longer than 12 months after production, it is recommended to cut a sample and test its breaking strength prior to use. Steel may lose some of its strength over time.

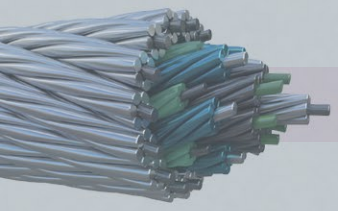
1.7 Prevent rope turning during installation



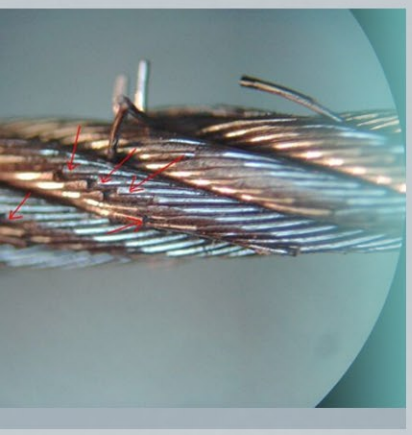
Although a wire rope shall be, and commonly is, spooled on the storage drum by the producer free of twist, which enables the riggers to install the rope twist free on the crane winch, one shall be aware and make certain that the rope is spooled on the crane winch free of twist (torque/turn).
In very critical situations one can lay out the rope twist free on the floor and paint the topside. The paint mark on the rope enables us to spool the rope on the winch without turning it by accident.

1.8 Cutting wire ropes

Cutting of steel wire ropes shall be done with a high speed disc cutter. It is very important to seize both sides next to the intended cut of the wire rope tightly with steel wire prior to cutting the rope. The tight seizing prevents the rope to unlay. Preformed ropes do not unlay, however certain ropes may have been lightly preformed for good reasons and may unlay slightly if cut without seizings.



1.9 Removing broken wires



Within the available discard criteria of wire rope due to broken wires (see www.neptunehyrope.com) these wire ends shall be removed carefully. Best to bend the broken wire end forward and backward until it breaks. Then make sure that the wire ends hide as deep as possible in the gap between the outer strands. Broken wires that stick out of the ropes' surface destroy both the rope and the drum or sheave grooves when running over sheaves and drum.

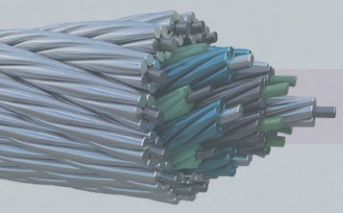
1.10 Slip & Cut

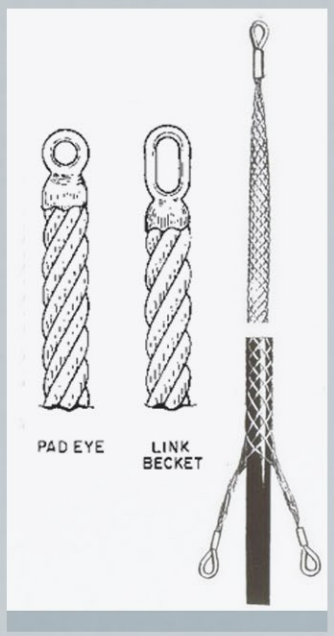
Very often wire ropes shall be discarded while only one or two short sections of the rope have been damaged or worn. If the system allows it and the length of the rope is sufficiently long, one can shorten the wire rope by cutting off the most damaged sections and re-install the shortened rope.

1.11 Spooling of a crane rope

The spooling from the storage reel on to the crane winch shall be done with a certain amount of back tension in order to get the wire rope tight in the grooves of the winch drum. The amount of back tension depends on the size of the rope and its strength (MBL – Minimum Breaking Load). Commonly a back tension of 1 to 2% of the rope's MBL is applied. Upon ordering a wire rope one shall agree on the specs of the storage reel with the producer, i.e. the amount of back tension the reel shall be compatible with.

Remember to wind the rope from the storage reel on to the crane winch drum in the same bending direction. So, from top to top or from bottom to bottom.





1.12 Reeving of a crane rope

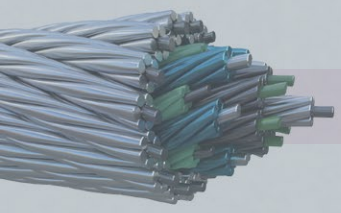
To install a wire rope on a new crane one usually rigs first a small rope into the reeving system with which the crane rope is connected and pulled into the reeving system.

In the case of replacement of a crane rope one connects the new rope with the old rope. By pulling out the old rope, the new rope is pulled in.

Often used connections are a welded link or reeving eye pad or a so called Chinese Finger, which contracts around the ropes firmly when it is pulled on.

1.13 Training of a crane rope

Before a wire rope is deployed full swing, it is recommended to train the rope. That is to cycle the rope two or three times with maximum 5% tension/load of its MBL on the rope. By training the rope one allows the component wires to find their optimal position before the actual job starts. This way constructional inconveniences are avoided. The training of a crane rope is a kind of warming up or maybe better compared with new shoes : best to wear them a few times before running a marathon with it.



1.14 Wire Rope quality monitoring

An installed crane rope shall be inspected periodically

a. visually, every time one uses the rope. Corrosion, damage and wire breaks can be diagnosed by the eye. See the attached discard criteria diagram.

b. technically, by measuring the rope's actual diameter, either 4 times per year or after every 25 lifting cycles.

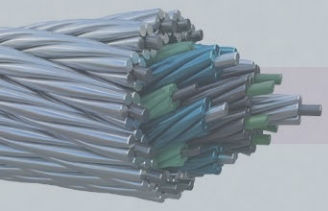
A wire rope in use shows a constructional and an elastic extension or stretch. Both result in a reduction of diameter of the rope.

The constructional extension happens during the first lifting cycles. The constructional setting of the component wires in the rope result into a permanent reduced rope diameter (see also the above item under 10). A common constructional extension of a crane rope is 0,50 to 0.80 %. Precisely the same percentage diameter reduction occurs.

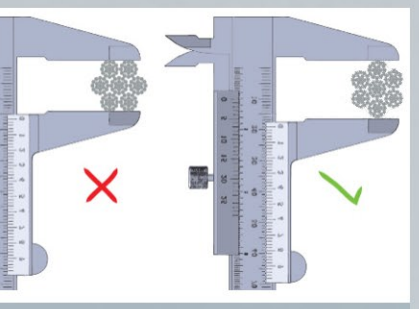
Elastic extension happens when the rope is put under load and is gone as soon the load is taken off the rope. At least as long as the wire rope is in good condition. By the time the rope approaches the end of its lifetime, the elasticity
of the component steel wires in the rope reduces, resulting into the elastic stretch becoming less and less elastic and more and more permanent. At the same phase several component wires can break on the outside and inside of the rope. Both above factors cause permanent diameter reduction of the rope, which makes the close monitoring of diameter reduction a reliable tool to watch the quality of a wire rope.

Allowable diameter reduction for a crane rope, both constructional and permanent elastic, shall not exceed 2%. As soon as the permanent rope diameter reduction approaches the 2%, one shall measure the rope every week or every 5 lifting cycles. Once the diameter reduction increases in short time from 2 till 3 or a higher %, the rope shall be replaced. No need to say that the rope shall always be measured at the same spots and under the same load. Since the rope is as strong as its weakest spot, the weakest spots shall be monitored in the first place.

It is important to use a large jaws, electronic diameter calibre.

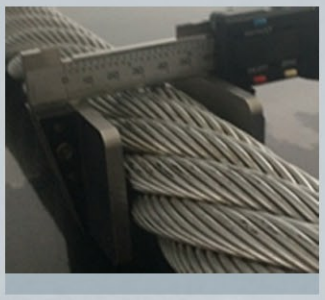


1.15 Wire Rope diameters



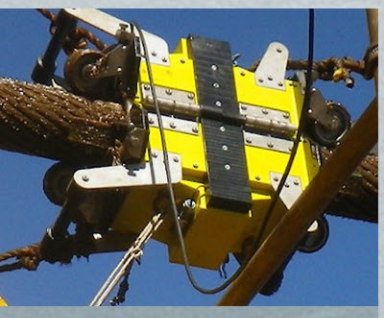
A wire rope has the following diameter parameters :

- The nominal diameter, i.e. the diameter as it is ordered – 100 (index)
- The design diameter - 103.5
- The diameter the rope has under 3% tension of the machine with which it is closed - 103.0
- The diameter the rope has on the storage drum with which it is supplied - 103.5
- The diameter at 10% load of the rope's minimum breaking strength - 102.4
- The diameter at 20% load of the rope's minimum breaking strength - 101.5



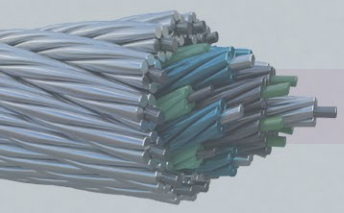
1.16 NDE or NDT magnetic flux testing

In order to assess the quality of a wire rope internally, beyond visibility, we nowadays avail of a method to see inside a wire rope by making a Magnetic Flux track of the rope. This NDE or NDT scan detects broken wires, loss of metallic area, and other internal rope distortion.



The most effective way of using this technology is to have a NDE scan made of the newly produced wire rope, which then later can be compared with the scans made after use in the field. This way, quality differences can be noticed. Kiswire offers NDE/NDT scans both of new ropes as well as ropes in use on site.

Saying all this, NDE scans to monitor the internal quality of wire ropes are hardly practiced due to extensive, costly operations involved with it, while bringing relative poor assessing results.



17. Lubrication of wire rope

During the manufacturing of wire rope, i.e. during the closing of the wires into a strand, lubricant is applied to provide the inside and outside of the strand with a lubricant. The same process goes for the IWRC of the rope. A wire rope therefore is lubricated entirely, inside and outside, when delivered.

The main function of wire rope lubricant is to reduce internal friction of the wire rope in use. The achievable number of bending cycles between a lubricated rope and a not lubricated rope is 100 versus 40, respectively.

Another friction reducing factor is the zinc coating on wires. Galvanized wire ropes generate lower internal friction than not galvanized wire ropes. The zinc layer acts as a lubricant. The secondary function of lubricant is to protect the rope from corrosion.

SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006 (REACH)
Revision date: 03-Feb-2016
Print date: 19-Oct-2016
Version: 3.0
Page 1/6

NYROSTEN T 55-13-20510

SECTION 1: Identification of the substance/mixture and of the company/ undertaking

1.1. Product identifier
Trade name/designation:
NYROSTEN T 55-13-20510

1.2. Relevant identified uses of the substance or mixture and uses advised against
Use of the substance/mixture:
Preservation of wire ropes or rope cores

1.3. Details of the supplier of the safety data sheet
Supplier (manufacturer/importer/only representative/downstream user/distributor):
NYROSTEN Korrosionsschutzmittel GmbH + Co.
Marktweg 71
D 47608 Geldern (Niederrhein)
Germany
Telephone: +49 (0) 2831 92456
Telefax: +49 (0) 2831 89793
E-mail: info@nyrosten.de
Website: www.nyrosten.de
E-mail (competent person): msds@nyrosten.de

1.4. Emergency telephone number
+49 (0) 2831 92456 (Only available during office hours.)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008 [CLP]:
The mixture is classified as not hazardous according to regulation (EC) No 1272/2008 [CLP].

2.2. Label elements
Labelling according to Regulation (EC) No. 1272/2008 [CLP]
According to EC directives or the corresponding national regulations the product does not have to be labelled.
Hazard statements: -
Supplemental Hazard information (EU): -
Precautionary statements: -

2.3. Other hazards
Adverse physicochemical effects:

Adverse human health effects and symptoms:
The melted product can cause severe burns. Processing vapours can irritate the respiratory tracts, skin and eyes.
Adverse environmental effects:

SECTION 3: Composition / information on ingredients

3.2. Mixtures
Description:
Preparation of hydrocarbons / petroleum products with additives.

en / GB / US

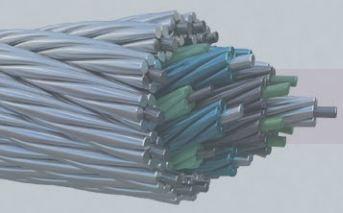
During the manufacturing of wire rope, i.e. during the closing of the wires into a strand, lubricant is applied to provide the inside and outside of the strand with a lubricant. The same process goes for the IWRC of the rope. A wire rope therefore is lubricated entirely, inside and outside, when delivered.

The main function of wire rope lubricant is to reduce internal friction of the wire rope in use. The achievable number of bending cycles between a lubricated rope and a not lubricated rope is 100 versus 40, respectively.

Another friction reducing factor is the zinc coating on wires. Galvanized wire ropes generate lower internal friction than not galvanized wire ropes. The zinc layer acts as a lubricant. The secondary function of lubricant is to protect the rope from corrosion.

Operating temperatures of the best available wire rope lubricants vary from minus 50 to plus 120 degrees Celsius.
Re-lubricating a wire rope in the field is a delicate matter. Realistically, a proper re-lubrication is hardly possible and therefore limited efficient. We know the following available methods of re-lubricating in the field.

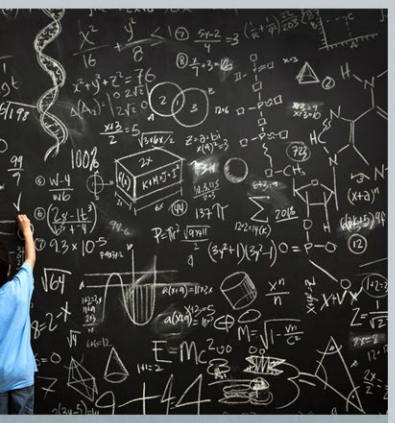
- To brush the lubricant on the rope while spooling it.
- To spray liquid lubricant on the rope while spooling it.
- To run the rope through a device in which the lubricant is pressed on and partly in the rope.



1.18 Life time of a crane rope

In the end it is all about the life time of the wire rope. How long will the rope service in good condition ? The service life determining factors of a wire rope are :

- The load/tension applied on the rope
- Drum and sheave diameters (D/d ratios)
- The number of sheaves and their position (D/D distance and possible Reverse Bendings)
- Velocity of operations (acceleration/deceleration)
- Tensile of the wires
- Weather conditions and accidents that impact the quality of the rope.



Quite often the producer of the wire rope is asked in this respect how many bending cycles a particular wire rope could achieve. Indications are about 300.000 cycles for a HYROPE 35xK7 or 40xK7 or 55xK7 at 10% tension of its MBL in the laboratory. Since, the average offshore crane does probably not more than 100 cycles per year, the theoretic bending cycle life time of a HYROPE is 3.000 years.

Obviously, the above laboratory bending fatigue results are one thing, the practical field wire ropes are being used in has a dynamic content, which effects the behavior and the eventual bending fatigue life.

Links : www.neptunehyrope.com