

HYDROPE

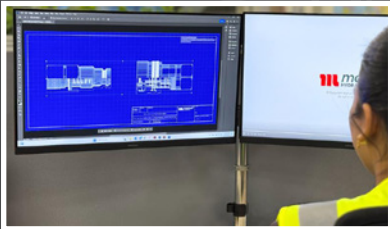


High-Tensile Hose for
Foundation Applications

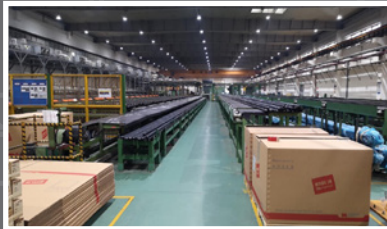
 **manuli**

 **manuli**[®]
HYDRAULICS

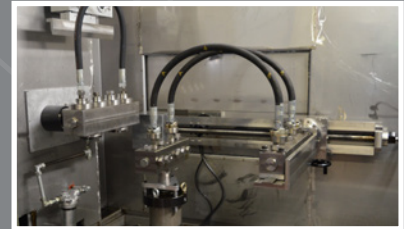
“Manuli Hydraulics is focused on achieving excellence in the design, manufacture, and supply of fluid conveyance solutions, components and associated equipment for high pressure hydraulics, industrial material conveyance, refrigeration and cooling applications.”



Our experienced Research & Development team take 2D drawings to 3D models to real life products.



Our world-class hoses, fittings and assembly equipment are manufactured in-house to the highest standards.



We test and validate our products to meet and exceed technical industry standards.

DESIGN

MANUFACTURE

TEST

SUPPLY

INTEGRATED SYSTEMS



We provide the complete solution: hoses, fittings, crimping parameters and assembly equipment for a fully integrated system.



We supply fluid conveyance solutions directly to our customers whenever and wherever they are.

From design to manufacture, and assembly, Manuli Hydraulics' continual commitment to this unified philosophy makes us a global leader in providing integrated solutions for fluid and material transfer connector applications including hydraulics, refrigeration & air conditioning, oil & gas, water and industrial low-pressure.

Manuli Hydraulics offer a complete range of hoses, fittings and assembly equipment which are purposely designed to work seamlessly together. This harmonized approach allows us to guarantee the quality and performance of our hose assemblies.

Every metre of hose and every single fitting is backed by industry knowledge and experience, made available to you through our dedicated team of application engineers.

From advice on component selection and configuration, our technical expertise allows us to support and work directly with our customers whenever and wherever they are based.

Disclaimer: We reserve the right to modify our products and/or related services and/or discontinue the manufacture and/or supply of any of the products and/or related services, without notice. This document supersedes all previous versions and previously issued documentation. The only official source of technical crimping parameters regarding our products is our Digital Crimp Tools. Printed copies are uncontrolled therefore, please be sure to use the latest versions of our Manuli [Crimp App](#) or [Crimp Web Tool](#). Do not mix and match: always use Manuli original hoses and fittings. For more information, see our '[Safety Guide](#)' by scanning the QR code.



DON'T MIX & MATCH

WORKING WITH INDUSTRY LEADERS TO DEVELOP OUTSTANDING PRODUCTS

Manuli Hydraulics are well established as global leaders in the supply of specialist hydraulic connectors to the foundation equipment sector, including hydraulic grabs, hydro mills and pile driving equipment. Over the years we have worked in partnership with some of the most prominent global brands in the industry to develop products which meet their exacting requirements in some of the most demanding applications.

When selecting a hydraulic hose for most normal applications, the tensile strength of the hose is not usually a critical determining factor. However, in certain applications, particularly those mentioned above, tensile strength can make a huge difference to the operational life of the hose.

In applications where high tensile forces, either static or dynamic, are present, these forces can lead to the creation of minute cracks and/or tears in the rubber tube of the hose. This can in turn lead to premature failure of the assembly, because as the hose ages, the cracks become more pronounced due to the rubber becoming less flexible.

For this reason, Manuli Hydraulics has developed HydroRope, a 42 MPa premium hydraulic hose with specially enhanced tensile properties, making it ideal for use in foundation digging applications where high tensile loads are applied directly to the hose.

Based on a standard 4 and 6 wire spiral hose arrangement, this extra tensile strength is provided by our unique (pat. pending) structural design which includes an additional wire braid layer directly below the outer cover. This design allows the tensile forces to be redistributed throughout the hose structure and prevents them from damaging the tube or spiral reinforcement.

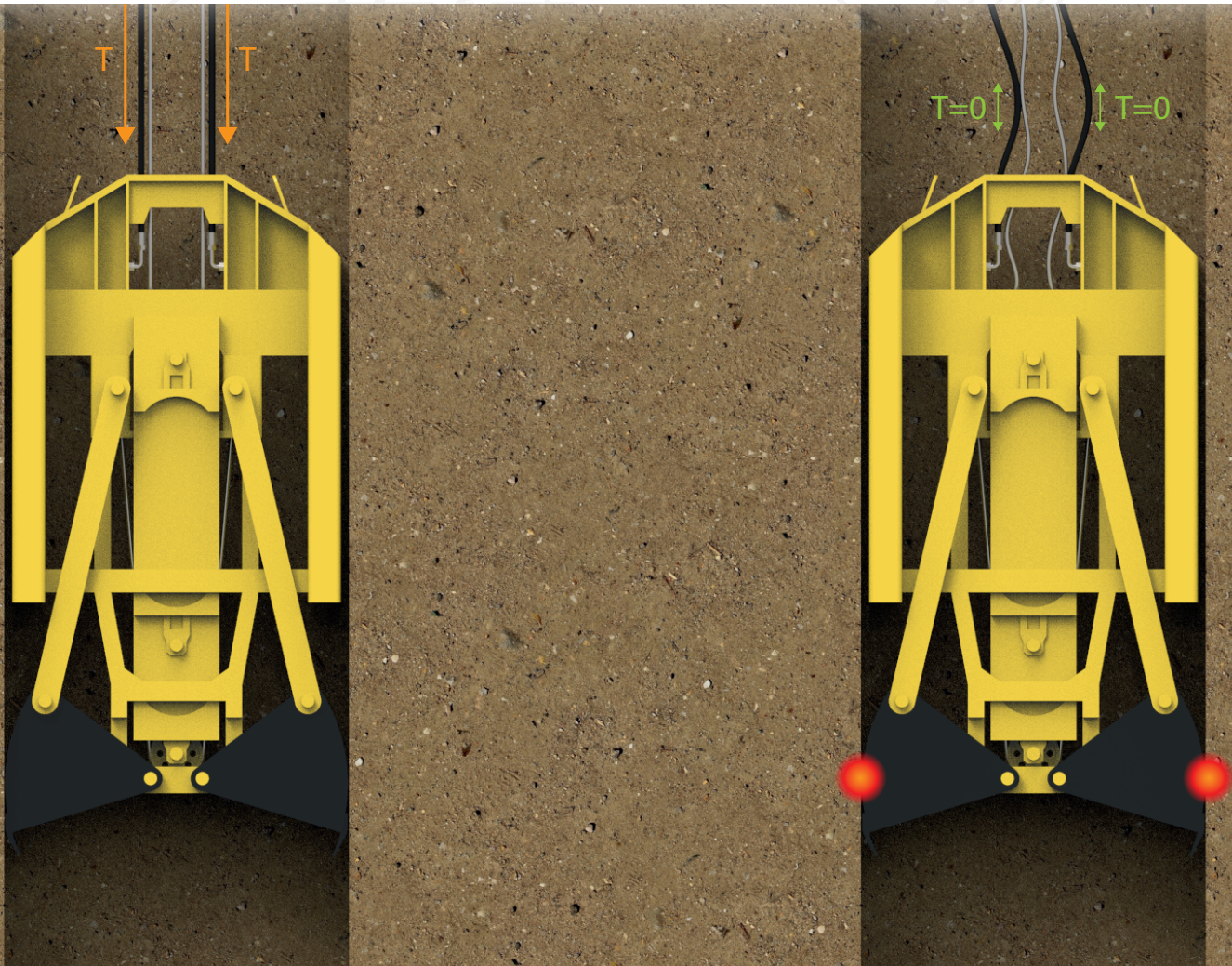
Features & Benefits:

- **Extreme Tensile Strength:** Delivers high strength and minimal elongation under tensile loading.
- **420 Bar Working Pressure:** Supports heavy duty power line applications with reliable pressure performance.
- **Wide Size Range:** Available in DN 25, DN 31, and DN 38, with DN 51, DN 63, and DN 76 coming soon.
- **Strong Type Super Cover (SC):** Provides enhanced abrasion resistance and cold temperature performance.
- **Integrated Interlock Fitting System:** Compatible with Interlock Plus and Interlock Super fitting solutions for secure assembly.



MAIN CAUSES OF HIGH-TENSION SHOCK LOADING OF HOSES

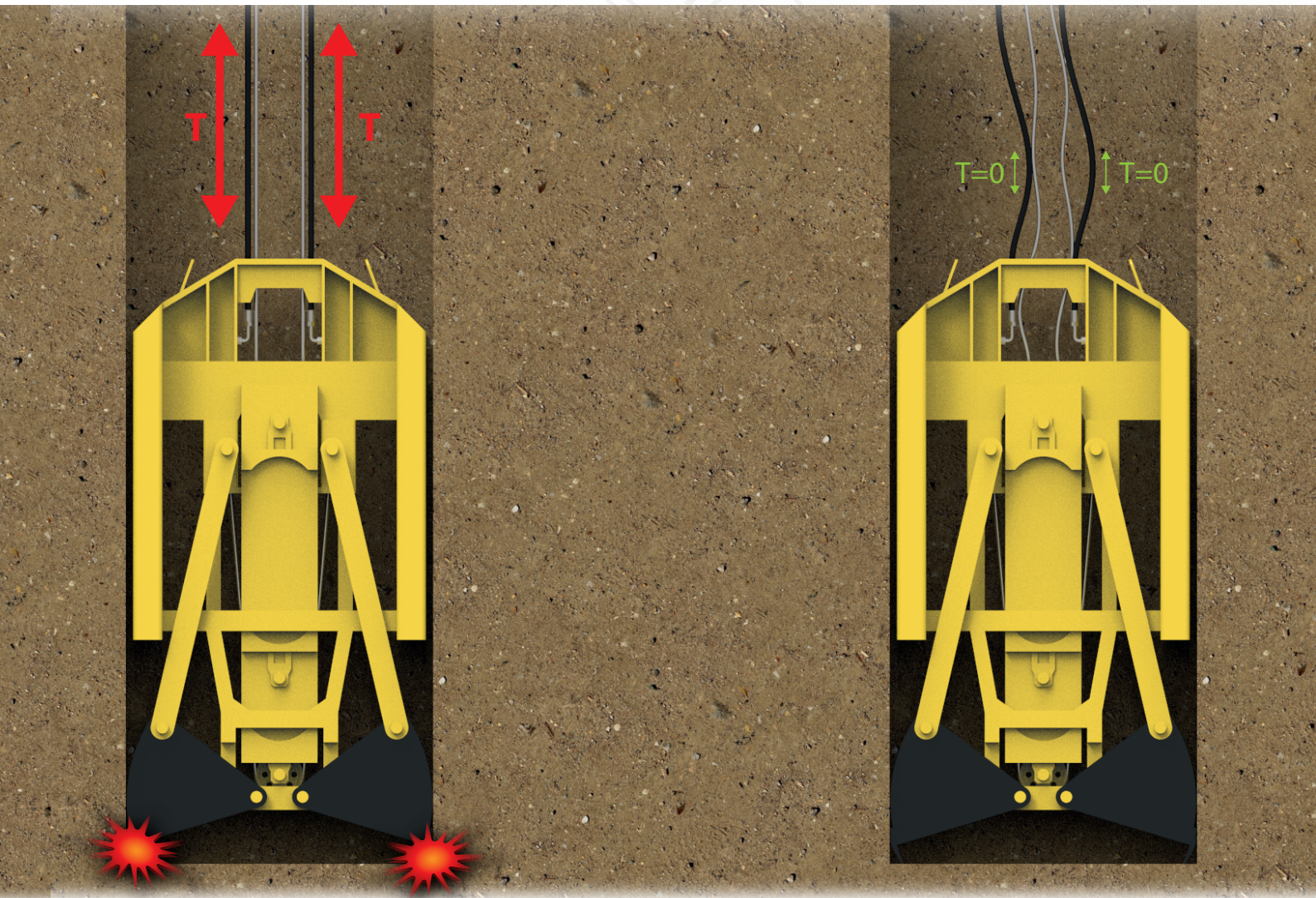
Foundation applications such as hydraulic grabs and hydromills are incredibly demanding even under optimal working conditions. However, when things start to go wrong they can lead to huge increases in the hose tension as well as highly damaging and dangerous levels of shock loading. The below examples give two typical “fault” situations where hydraulic grabs and hydromills can experience these conditions.



During normal operation the hydraulic hoses are in moderate tension caused by the connection between the grab body (which is supported by the metal cables) and the spring loaded coiling mechanism on the crane boom arm.

This tension is enough to keep the hoses from flailing around, but not enough to do them any serious harm.

However, if the grab gets stuck suddenly during its descent the metal cables and the hoses can become slack, as they continue to wind-out even though the grab body is no longer being lowered. This means that the tension in the hoses and cables is effectively reduced to zero for a brief period and the entire weight of the grab is supported purely by the friction between the grab and the walls of the hole. The hose, being spring-loaded, will then retract back to its normal state of moderate tension, but this time the cable is not supporting any of the weight.



So, if the tool were to suddenly become unstuck, the entire weight of the grab would act upon the hoses until the grab either hit the bottom of the hole or reached the extent of the slack cable. This would result in the hoses being rapidly dragged off the coiling mechanisms and experiencing tensions far in excess of normal operating conditions.

To further complicate things, the rapid uncoiling of the hoses can also lead to the coiling mechanism going into a state of free spinning due to the high rotational momentum of its flywheel-like design. This essentially means that when the weight of the grab is once again being supported by either the cable or the ground the hoses would continue to unwind for a short period - again effectively reducing the tension in them to zero before the spring recoil kicks in again.

This scenario is one of the major causes of hose shock-loading in grab applications

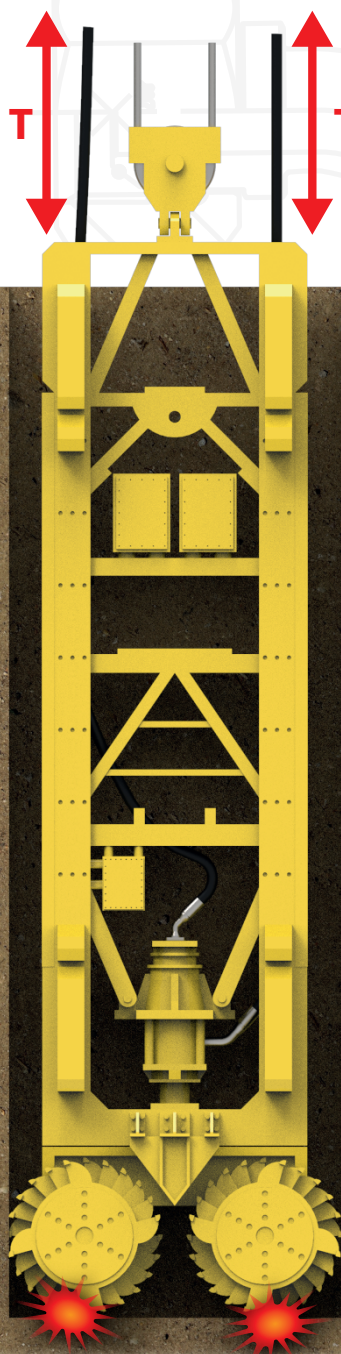


Similarly, during normal operation the hydraulic hoses are in moderate tension between the cable-supported hydromill body and the spring-loaded coiling mechanism.



If one of the hydromill rotors gets stuck part-way through the descent, the whole tool can become tilted. This can cause the hose on one side of the tool to experience a decrease in tension, whilst the other side experiences a significant increase in tension.

Coupled with the fact that the supporting cable may become slack due to the sudden stop, when the obstruction eventually clears...



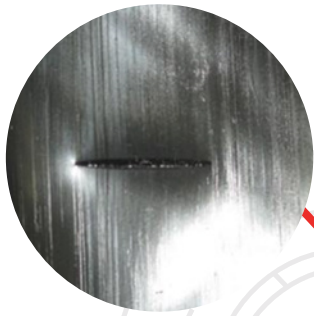
... the entire weight of the hydromill tool would act upon the hoses until the tool either hit the bottom of the hole or reached the extent of the slack cable.

In the same way as with the grab tool, this would result in the hoses being rapidly dragged off the coiling mechanisms and experiencing tensions far in excess of normal operating conditions.

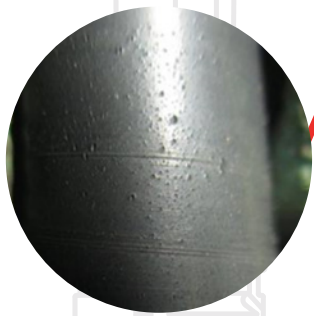
Once again, this sudden “stop-start-stop” situation can cause the hose to flap around as the momentum of the rapidly spinning hose reel begins a viscous cycle of uncoiling and recoiling hose. The tensile forces exerted on the hoses during these fault cycles can be extremely high and have been known to cause severe damage to the hydraulic hoses.

manuli®

HIGH-TENSIL HOSE FOR FOUNDATION APPLICATIONS



Tear in hose tube due to excessive tensile loading



*Micro-cracks in hose tube due to excessive tensile loading
hose connector in use*



TENSILE TESTING

The innovative design of HydroRope has been developed in conjunction with major global OEMs and has endured exhaustive field testing in some of the harshest conditions imaginable.

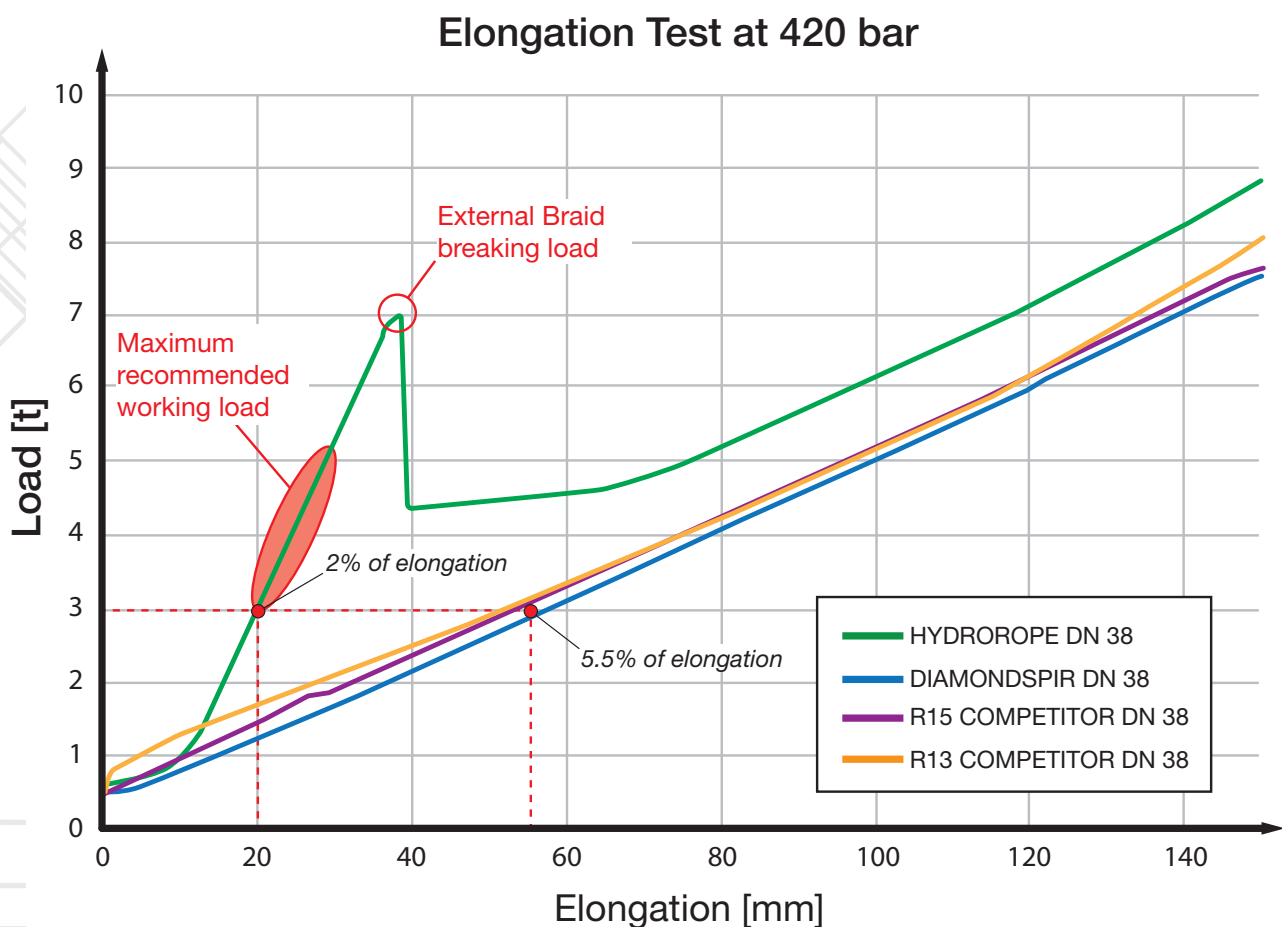
This is to ensure that its real-world performance far exceeds that of typical hydraulic hoses, allowing it to be safely used in situations where both static and dynamic loading is present.

In fact HydroRope can comfortably support static loads of up to 3 to 5 tonnes* (safety factor of 2:1) without it having a detrimental effect on the hose performance or lifespan.

Tensile testing is a standard engineering test in which the two ends of a specimen are subjected to a steadily increasing load and the subsequent elongation of the specimen is measured. The results of several different specimens plotted together on a graph allow us to visualise the comparative tensile strengths of each specimen.

In the case of HydroRope, we tested it against a number of wire spiral hoses likely to be used in the same applications to see how the additional wire braid layer affected the performance. Each specimen was pressurised to 420 bar to ensure a real world operational comparison. As shown in the below graph, the elongation of the HydroRope specimen, when subjected to up to 7 tonnes of force, was up to 70% less than the elongation of all of the comparative specimens. This means that whilst in this range the inner tube of HydroRope is subjected to far less extension and is therefore far less liable to be damaged than the inner tube of the other sample hoses.

Even after the wire braid layer has finally broken (at approx. 7 tonnes), the wire spirals are completely unaffected and continue to provide a similar elongation profile to the other samples, although still performing at a noticeably higher level.



* HydroRope is not intended to be used instead of standard lifting cable (or similar) as the sole means of supporting loads. As such it does not have a Safe Working Load (SWL) value. The design of HydroRope is intended to provide additional protection and performance in tension applications, where the normal working load applied to the hose would cause cumulative internal damage to standard hoses. The application of high tensile loads, especially dynamic or shock loads, directly to the hose in normal operational conditions is not recommended or covered by the Manuli Hydraulics Warranty.

INTEGRATED FITTING SOLUTIONS

The Interlock Plus fitting solution has long been regarded as the gold standard for a high-pressure fitting solution. Tested to 1 million impulse cycles and with a double-skive, bite-the-wire design, Interlock Plus fittings guarantee the highest levels of fitting security, service life and leak protection, making them the go-to fitting for major OEMs.

Along with the even more robust Interlock Super range, this extreme performance makes these the ideal fitting solutions for HydroRope.

In cases of high axial tension one of the most important factors of the Interlock Plus and Interlock Super design is the “locking” area, which provides constricted metal-to-metal contact between the hose reinforcement and the fitting to actively resist tensile forces. The internal “teeth” of the ferrule have also been proven to provide a firm grip on the hose reinforcement without the risk of accidentally cutting through the wire.

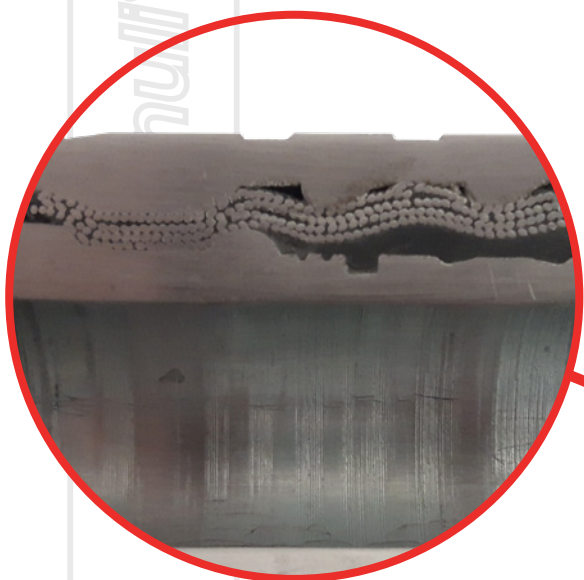
The Interlock Super range also provides additional length on the hose insert to further improve the security of the hose-fitting connection.



Interlock Plus



Interlock Super



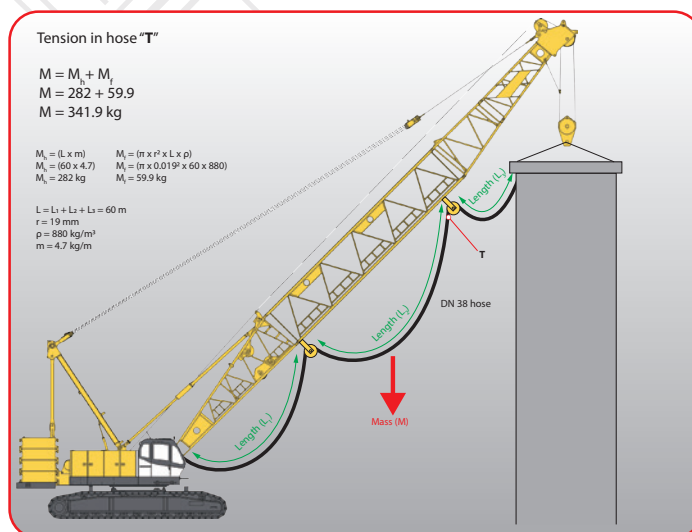
LONG LENGTH APPLICATIONS

In addition to applications where the hydraulic hoses are being mechanically pulled, the high tensile strength of HydroRope also makes it ideal for many other applications where long lengths of suspended hose are required.

Offshore pile-driving, construction pile-driving and certain mining applications typically require extremely long lengths of hydraulic hose, many of which are only partially supported by pulleys, leaving large sections of the hose freely suspended. As these are usually large bore hoses, the suspended weight of the hose including the hydraulic fluid can be several hundred kilograms between supports.

In this example a DN 38 hose with a suspended length of just 60m would exert a tensile force of approximately 340kg on the hose. In large scale applications, such as offshore piledriving, where the hose lengths can reach between 120m and 150m, simply supporting its own suspended weight would be taxing for most normal hoses.

HydroRope, on the other hand, can easily support its own weight, including hydraulic fluid, for lengths up to 500m.

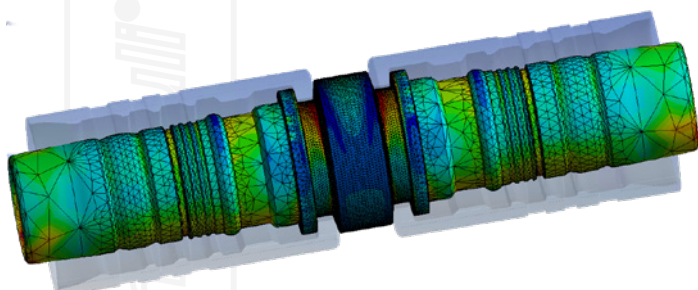


ROBUST HOSE-TO-HOSE CONNECTION

Hydromills and hydraulic grabs can require hose lengths of well over 100m meaning that the weight of the tool is not the only significant tensile force acting on the hose assemblies.

This requirement for long lengths of hose means that they will inevitably require at least one hose-to-hose connection. If these connections result in weak-points in the complete hose assembly then any benefits of a high-tensile hose would be lost. That is why Manuli has developed a dedicated double-connector for use in these applications. This connector uses Manuli's Interlock Plus double-skive insert and ferrule to ensure a highly robust connection, while its compact dimensions allow it to pass over the smaller diameter boom-end pulleys without the risk of the hose becoming dislodged from the pulley groove.

The small diameter of the boom-end pulleys also puts significant stress on the connection by requiring the hose to bend far closer to the ferrule than would normally be recommended. The intelligent design of the connector, coupled with extensive field testing and FEA simulation, means that even under these harsh conditions Manuli guarantees that the connection is sturdy enough to endure repeated, long-term use without detrimentally affecting the life of the hose.



FEA simulation of double-end hose connector in use.



FULLY INTEGRATED ASSEMBLY SOLUTIONS

As the world's leading manufacturer of integrated hydraulic connector solutions it goes without saying that Manuli offers a range of assembly equipment that has been proven to work seamlessly with both HydroRope and its relevant fitting solutions. Foremost amongst these solutions are the GoldenCrimp/420 and the MS 480 crimping machines.

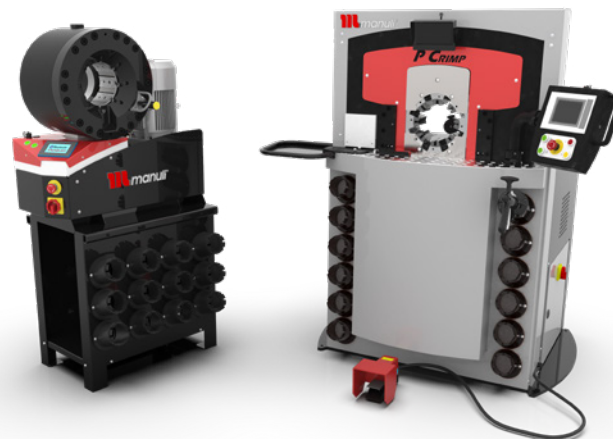
Both machines are ideal for use with large bore, wire-spiral hoses and are rugged and reliable enough to withstand heavy usage, either in a field-repair workshop (GoldenCrimp/420) or on an OEM hose assembly line (MS 480).

MS 480 machines come with Manuli's proprietary SCS control system as standard, whereas the GoldenCrimp/420 is available with three different levels of automation, including the new bluetooth enabled controllers which link directly to your smart-phone or tablet. All three systems are designed to ensure that the possibility of human error creeping into your crimping operations is minimised as much as possible.

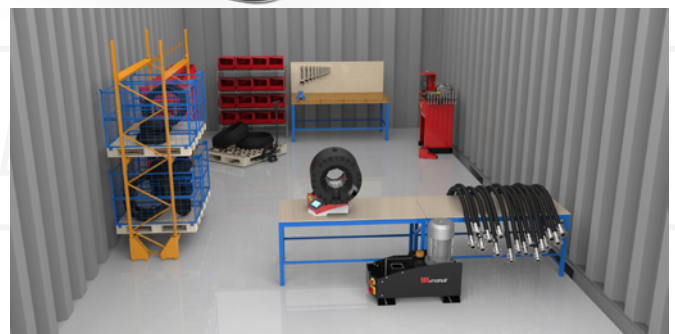
The GoldenCrimp/420 also offers a split-head design which allows the crimping head and controller to be located remotely from the power pack if required.

Features & Benefits:

- **High Crimping Force (420 or 480 tonnes):** Delivers the power required for consistent crimping of large bore and wire spiral hoses.
- **Wide Opening with Long Master Dies:** Accommodates a broad range of hose and fitting combinations for greater assembly flexibility.
- **Full Range of Die Sizes:** Supports diverse hose assembly applications across multiple industries.
- **Integrated Die Storage:** Keeps dies organised and readily accessible, reducing setup time and improving productivity.
- **Foot switch Operation:** Enables hands free control for improved safety and ease of use.
- **Robust & Reliable Operation:** Designed to withstand demanding workshop and OEM production environments.



Goldencrimp 420



Goldencrimp 420 (Split-Head)



FEATURES & BENEFITS:

- Designed to resist pulling force
- High pressure resistance
- Superior abrasion resistance
- High ozone and weather resistance
- Flame resistance to a wide range of specs
- Anti-static and anti-toxic cover

APPLICATIONS & FLUIDS:

Heavy duty power lines in severe environmental conditions. Specific installations with tough abrasion conditions.

Off-shore applications, underground and open-pit mining, special machines where hose high pulling resistance is required (grabs, etc.) Mineral oils, vegetable oils and synthetic ester based oils (up to 100°C/212°F), glycols and polyglycols, mineral oils in aqueous emulsion, water.

																	
PART REF.	HOSE SIZE			R.O.D		O.D		MAX. W.P		BURST		MIN. BEND		WEIGHT		FITTINGS	
	DN	dash	inch	mm	inch	mm	inch	bar	psi	bar	psi	mm	inch	g/m	lb/ft	Std 1	Std 2
H10136025*	25	-16	1"	38.2	1.50	41.4	1.63	420	6,090	1,680	24,360	400	15.51	2,910	1.95	IP+M01850-16	-
H10136031*	31	-20	1.1/4"	46.9	1.85	50.1	1.97	420	6,090	1,680	24,360	450	17.72	3,749	2.52	IP+M01600-20	-
H10136A38*†	38	-24	1.1/2"	53.2	2.09	56.5	2.22	350	5,076	1,400	20,305	500	19.65	4,256	2.86	IP+M01600-24	-
H10136038*	38	-24	1.1/2"	54.7	2.15	57.3	2.26	420	6,090	1,680	24,360	600	23.62	4,650	3.12	IS+M02700-24	-
H10136051*	51	-32	2"	69.2	2.72	72.4	2.85	420	6,090	1,680	24,360	800	31.50	6,590	4.42	IS+M02700-32	-
H10136063*	63	-40	2.1/2"	84.1	3.31	87.3	3.44	380	5,511	1,520	22,045	900	35.43	9,405	6.31	IP+M01900-40	-
H10136076*	76	-48	3"	97.1	3.82	100.2	3.94	380	5,076	1,400	20,305	1000	39.37	11,106	7.46	IS+M02700-48	-

Refer to the latest Manuli Digital Crimp Tools for crimping parameters.

TECHNICAL SPECIFICATIONS:

Continuous Service Temperature Range

50.0 °F, 250 °F
-46.0 °C, 121 °C

Tube

Oil resistant synthetic rubber.

Reinforcement

Four (DN 25, DN 31, DN38-Compact) and Six (DN38-Dn76) high tensile steel spirals + One high tensile steel wire braid.

Cover

STRONG - TYPE "SC"

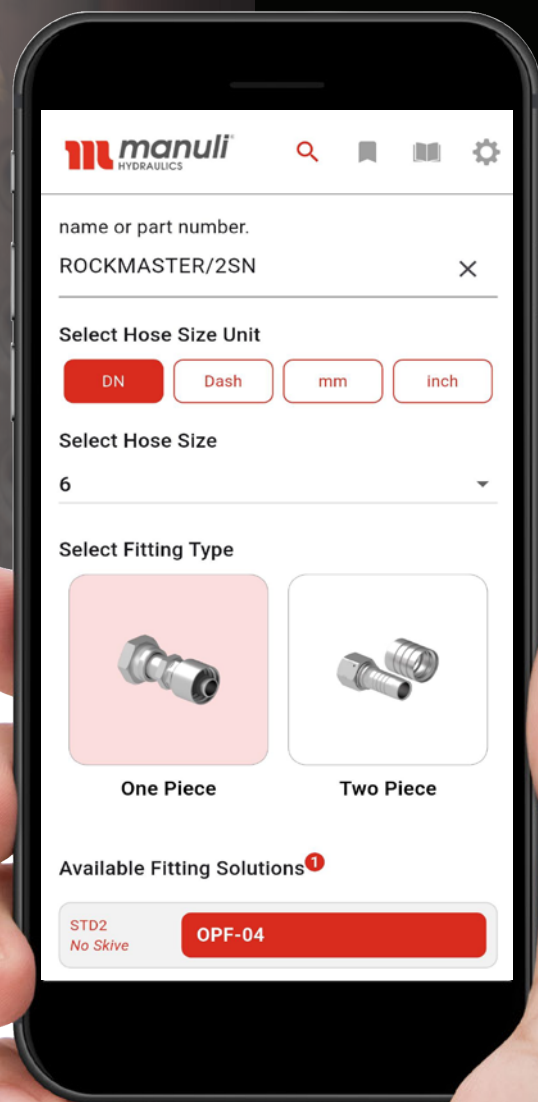
Synthetic rubber with high abrasion, ozone, weather and heat resistance and an extended operational temperature range.

Applicable Standards

Manuli® Design.

Type Approvals

MSHA;



manuli[®] CRIMP HYDRAULICS

YOUR SOURCE FOR THE MOST UP TO DATE CRIMP PARAMETERS

Stay up to date using Manuli's Digital Crimp Tools, available as an App and a Web version, our Crimp Tools are your go-to resource for accurate, efficient, and safe hydraulic hose crimping. Designed with professionals in mind, this innovative tool grants instant access to the latest crimp specifications, ensuring precision, and reliability in every assembly.

Whether in the workshop or on the go, Manuli Digital Crimp Tools provide real-time access to an extensive database of hose and fitting specifications, helping to reduce downtime and boost productivity.

Key Features of Manuli's Digital Crimp Tools:



Print Feature: This feature supports printing crimping parameters as reference charts for both single or multiple hose sizes within a selected hose family, supporting workshop and warehouse use.



Saved Items: Frequently used hose and fitting combinations can be saved within the app, allowing quick access to commonly used crimping parameters during routine hose assembly tasks.



Technical Centre: The Digital Crimp Tools are supported by a dedicated section on our website called the Technical Centre. This integrated resource provides expert insights, practical tips, and industry knowledge, with access to in depth guides and best practice information.



Accurate Crimping Parameters: To ensure accuracy on their crimping parameters, customers should regularly access the Manuli Digital Crimp Tools to check for updates. It is also recommended that printed charts should be reprinted regularly to ensure crimping information remains up to date.

Download the Manuli Crimp App Now



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