

Steel ropes for the OIL INDUSTRY



june 2009 version



Wire ropes for land-based rigs

The land-based drilling rigs used in the oil drilling are one of the best challenges for a steel rope; therefore the ropes to be used must be specifically designed and manufactured for this application.

IPH SAICF Quality Management System is API Std Q1 certified, and its ropes show API 9a monogram according to license N° 0018 9a owned by IPH SAICF since 1989.

These products are leaders in the Argentine land-based drilling market and are regularly exported to highly developed countries in terms of oil industry.



Lic. N 0018 9a

Summary

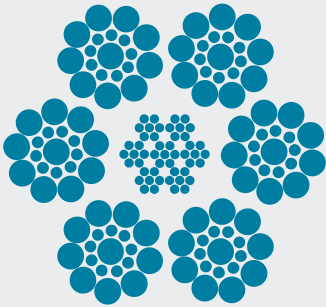
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San Miguel Manufacturing Plant,
Buenos Aires, Argentina.



IPH 619API



The main rope of the rig, or drilling line, is subject to high stresses combined with demanding sizes of sheaves and drums.

IPH 619API wire rope, suitable for any rig, exceeds the lifetime recommended by API RP 9b Standard, providing high performance and optimizing cost.

DATA SHEET

Construction: 6x19 Seale (1 + 9 + 9).

Core: Independent wire rope

Default finish: Bright, lubricated.

Lubrication: Hot applied in all wires of both the core and strands.

Lubricant: Mineral base with anti-corrosion, adherence and extreme pressure additives, among others.

Default resistance: EIP grade, grade EEIP upon request.

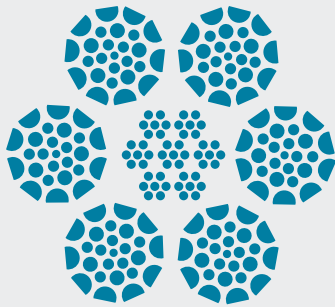
Lay: Regular right or left, upon request.

Manufacturing standard: Meets or exceeds API 9a Standard.

Diameter	Approx. Mass	Minimum breaking load			
		IPS Grade		EIP Grade	
(mm)	(kg/m)	(kgf)	(kN)	(kgf)	(kN)
22,20	2,09	36097	354	39768	390
25,40	2,76	46905	460	51596	506
28,60	3,49	58937	578	64852	636
31,80	4,31	72499	711	79739	782
34,90	5,20	87081	854	96156	943
38,10	6,20	102988	1010	113184	1110
41,30	7,28	121014	1187	132996	1304

For other constructions, diameters or resistances do not hesitate to contact us.

IPH GPC



IPH GPC rope, with compacted strands, offers 20% ton-mile over IPH 619 API and minimizes the loss of diameter under stress. Since the breaking load is higher, the service factor increases; therefore, it is recommended for deep drilling with naturally low service factors.

DATA SHEET

Construction: 6x26 Warrington Seale with compacted strands (1 + 5 + 5/5 + 10).

Core: Independent steel cord (IWRC).

Default finish: Bright lubricated.

Lubrication: Hot application in all wires of the core and strands.

Lubricant: Mineral base with anti-corrosion, adherence and extreme pressure additives, among others.

Default resistance: EIP grade, EEIP grade upon request.

Lay: Regular right or left, upon request.

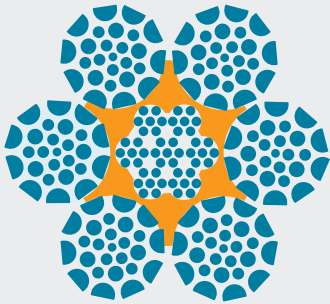
Manufacturing standard: Meets or exceeds API 9a standard requirements.

Differential characteristics: Larger resistant metallic area, with higher breaking load, better support on pulleys, higher resistance to abrasion, minimum loss of diameter under wear.

Diameter	Approx. Mass	Minimum breaking load			
		IPS Grade		EIP Grade	
(mm)	(kg/m)	(kgf)	(kN)	(kgf)	(kN)
28,60	3,58	65262	640	71875	704
31,80	4,42	80683	791	88859	871
34,90	5,33	97180	953	107028	1049
38,10	6,35	115818	1136	127555	1250
41,30	7,46	136090	1335	149882	1468

For other constructions, diameters or resistances do not hesitate to contact us.

IPH GPCL



IPH GPCL rope, with compacted strands and plastic coated core is an improved alternative for deep drilling with low service factors and hard soil or other operating difficulties. It offers higher breaking load, with lower loss of diameter under stress and great stability in the drum. It reates 20% ton- mile more than IPH 619API.

DATA SHEET

Construction: 6x26 Warrington Seale with compacted strands (1 + 5 + 5/5 + 10).

Core: Independent wire rope (IWRC) with thermo-plastic process.

Default finish: Bright lubricated.

Lubrication: Hot application in all wires of the core and strands.

Lubricant: Mineral base with anti-corrosion, adherence and extreme pressure additives, among others.

Default resistance: EIP grade, EEIP grade upon request.

Lay: Regular right or left, upon request.

Manufacturing standard: Meets or exceeds API 9a standard requirements.

Differential characteristics: Higher breaking load due to metallic area and core coating, higher resistance to abrasion, minimum loss of diameter under wear.

Diameter	Approx. Mass	Minimum breaking load			
		IPS Grade		EIP Grade	
(mm)	(kg/m)	(kgf)	(kN)	(kgf)	(kN)
28,60	3,64	68850	675	75786	743
31,80	4,51	85170	835	93738	919
34,90	5,43	103020	1010	113220	1110
38,10	6,47	122400	1200	134640	1320
41,30	7,60	143824	1410	158206	1551

For other constructions, diameters or resistances do not hesitate to contact us.

Slip and cutoff plan

The run and cutoff program must be set according to:

- API recommendations about working limits.
- Correction of these limits according to the service factor (API).
- Adjustment of limits to specific situations.
- Optimization of the run and cutoff program through systematized experience.

SIMPLIFIED LIMIT TABLES

API recommendations about working limits cover a great number of cases and variables. The following simplified tables include the most typical values of work limits in ton-mile, and the corresponding cutoff lengths. Although these combinations apply to many cases, we recommend to consider the contents of “Explanatory Notes” for their application.

Diameter (in)	Work limit for cutoff (I) (ton.mil)	Cutoff length (II) (m)
7/8	350	18
1	500	18
1 1/8	800	24
1 1/4	1200	30
1 3/8	2000	35

I. For Service Factor =5

II. It is recommended to adjust the length to the specific characteristics of the rig.

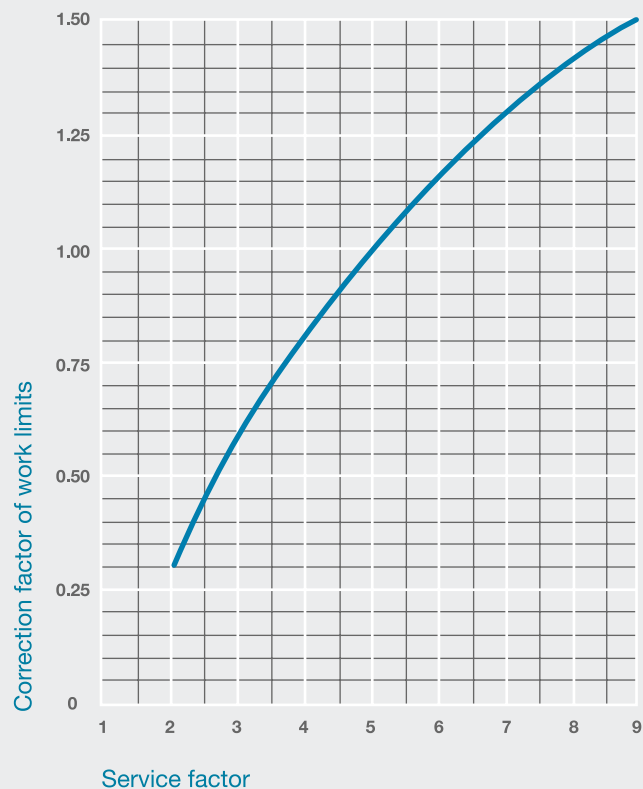
EXPLANATORY NOTES

IPH SAICF introduces this simplified table considering these premises:

- The reference Standard for this table is API RP 9b.
- The simplified table shows the values for “light duty” according to the Standard.
- IPH 619API ropes from IPH SAICF generally meet these values or even higher in all types of work, considering correction due to Service factor.
- The length to be cut are approximations that result from the average of values

The table ton-mile must be multiplied by the factor obtained in the graph.

(This correction is not performed when working with the compensated ton-miles system)



corresponding to most frequent drum and mast sizes. It is convenient to adjust these lengths to the specific characteristics of each rig.

- Anyway, as set in the Standard, these limit values are guidelines, and selecting a ton-mile limit to use is up to the Drilling Contractor.
- 7/8" rope is not included in the Standard. IPH suggests a limit obtained by quadratic extrapolation of 1".
- 7/8 y 1" ropes: IADC Standard and Manual highlight that in light operations, with low ton-mile total, the speed determines the rope wear; therefore, attention should be paid to the rope visual condition.
- As any simplification, this tables loses some accuracy in contrast with original API RP 9b tables. IPH has made its best effort to introduce a useful and adequate tool for the Oil Industry. However, in the event of doubt, the complete tables of the Standard should prevail.

Visual inspection of the drilling line

The **drilling rope care** involves two essential pillars:

- Strict compliance with the run and cutoff program
- Visual inspection

To keep a safe operation, the rope must be cut as stated in the run and cutoff program, whatever takes place first.

Visual inspection consists in the following observations: (adapted from ISO 4309):

- Loss of diameter: The maximum allowed is 7%; after this situation it becomes critical.
- Count of broken wires:
 - In a length equal to 6 diameters of rope, **between 3 and 6 broken wires is considered critical**, according to the expected service demand.
 - In a length of 30 diameters of rope, **between 6 and 12 broken wires is considered critical**, according to the expected service demand.
- Localized anomalies: very close broken wires in only one strand (3 are critical), kinks, knots or other permanent deformations. Any of these situations is considered critical.

Visual inspection interacts with the run and cutoff

program. If visual inspection shows that the cutoff rope is in good conditions, this situation must be considered for the systematic optimization of the run and cutoff program; however, do not make changes in the run and cutoff program based in few observations and short time. Again: **if the run and cutoff program indicates to slip rope, this instruction must be followed, regardless of its condition. It is expected that the rope is far from the critical condition.**

On the contrary, if the visual inspection shows that the rope is in quasi-critical conditions, it must be cut until eliminating the section in bad conditions. This situation is not probable if the run and cutoff program is well set and met.

Oil ropes service factors

Service Factor results from dividing the minimum breaking load of the rope by the real load on it.

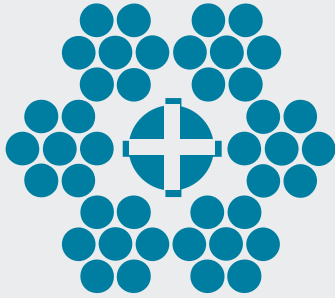
The Service Factor is characteristic of each operation and plays an important role in implementing the run and cutoff program.

Line	SF recommended	SF minimum allowed
Drilling line	5	3 in deep drilling 2 when setting casing
Sand line	5	3
Mast raising line	5	2.5
Auxiliary hoisting winch rope	5	3 (not recommended)
Winch truck rope	5	API does not specify. Experience indicates a minimum of 2.5 with extreme precautions.

Source: API RP 9b Standard



IPH 67API



The secondary wire rope in a workover rig is the so called “sand line” or “swabbing line” (when used for production). The 6x7 construction, with highly resistant synthetic fiber, is the most used for this application, because of its high resistance to abrasion and corrosion and its low initial cost.

DATA SHEET

Construction: 6x7.

Core: Polypropylene fiber acid- resistant.

Default finish: Bright, lubricated.

Lubrication: Hot application on all strand wires.

Lubricant: Mineral base with anti-corrosion, adherence and extreme pressure additives, among others.

Default resistance: IPS grade.

Lay: Regular right or left, upon request.

Manufacturing standard: Meets or exceeds API 9a standard.

Soul for high temperature: Over 80°C the polypropylene soul can start plastification; therefore, in non-frequent cases of high temperatures, the rope with steel core can be supplied.

Diameter	Approx. Mass	Minimum breaking load			
		IPS Grade		EIP Grade	
(mm)	(kg/m)	(kgf)	(kN)	(kgf)	(kN)
14.30	0.47	11828	116	12950	127
15.90	0.58	14377	141	15805	155

For other constructions, diameters or resistances do not hesitate to contact us.

USER TOOLS

Recommendations to use the sand line rope

These are the main stresses of the sand line rope:

- Strong abrasion due to contact with the walls of the well.
- Strong corrosion due to the attack of the well liquids (many times acid).
- Shock unloading, which may cause deformations, knots or tangles.

This rope calls for careful operation with these main factors:

- Neat winding on the drum, using an appropriate spooling device.
- Careful speed handling.
- Rinse and re-lubrication when working with acids (at the contractor's discretion).

Sand line rope duration is highly dependent from the characteristics of the well and the operator's skills.

Sand line rope visual inspection

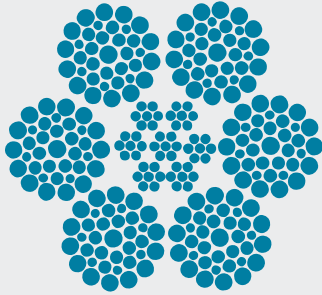
Sand line rope visual inspection is subject to general standards of any type of rope, with these specific considerations: (adapted from ISO 4309):

- Loss of diameter in the most worn area: maximum accepted 8%.
- Broken wires in the most worn area: In a length of 6 times the diameter, the accepted maximum is 3 broken wires and not in the same strand.

Other visual criteria:

- kinks, knots or other permanent deformations resulting from tangles.
- Weld splash or other signs of burning.
- Protrusion of the fiber core.
- Loss of diameter due to lack of core. This is a very severe situation in which the rope loses the circular shape of the section. The rope must be immediately removed from operation.
- Advanced corrosion. Although the total rope diameter is correct, there may be irregularities in the diameters of individual wires resulting from corrosion.

IPH 636



Winch truck ropes are always subject to high demands due to high loads and the reduced drum and roll size.

IPH 636 rope provides high traction and crushing resistance together with great flexibility at a low cost.

DATA SHEET

Core: Steel.

Steel grade: 1960 N/mm².

Lay: Normally right. Left can be provided upon request.

Surface finish: Bright, lubricated.

Diameter	Approx. Mass	Minimum breaking load	
		(kgf)	(kN)
(mm)	(kg/m)		
22	1,98	34500	338
26	2,76	48200	472
28	3,21	55800	547
32	4,19	73000	715



USER TOOLS

Recommendations to use the winch truck rope

The different performance of the rope is evident when handled by an expert operator or a careless or new one. The keys for safe use are:

- Lift the load softly, with no jerks or shock loads.
- Keep a strict inspection plan. The critical sections are: the joint with the tail-chain, the inner lays on the drum and the section overpassing on the rear roll.
- During both installation and operation the rope must be wound with stress, never loose.
- Winded with stress, the coils together.

IPH SERVICE

We are your partner in reducing your operation costs

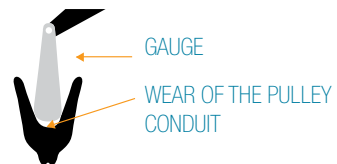
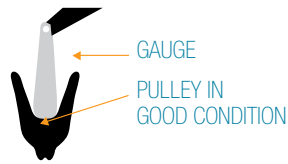
Exclusive services for regular IPH products users:

- Stock planning and “just in time” delivery.
- Advice on the application of specific standards (for example, API RP 9b).
- Tailor made and optimized slip and cutoff programs.
- Advice on the hoisting risk analysis.
- Advice in person in the well or virtual in our website.
- Training seminars for the staff and crew.



Control of the condition of the sheave grooves

- The condition of the sheave exerts a determinant influence on the steel rope performance.
- The diameter and condition of the conduit must be periodically controlled, as well as alignment, offset and freedom of the roller.
- The condition of the conduit is controlled with gauges.



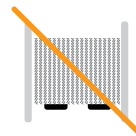
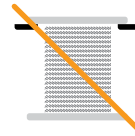
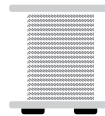
Reels movement with the forklift

CORRECT

The forks must take the spool by the wood and at the bottom part.

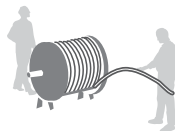
INCORRECT

These ways of taking the spool are incorrect and dangerous.

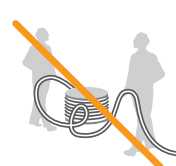


Handling of the steel rope

CORRECT



INCORRECT



Turn the spool. Roll the roll.

WARNING

- ▶ The fail of a wire rope or sling can result in severe damages, even death.
- ▶ The wire rope or sling can fail in cases of damages, abuse, incorrect use or maintenance.
- ▶ Inspect the steel rope or sling before every use.
- ▶ Obtain information from the manufacturer and IRAM, ISO, API or equivalent standards.



Source: Wire Rope Technical Board

COMPANY

Over 60 years of ongoing production and renewal

Born 60 years ago in the Northern area of Greater Buenos Aires, Argentina, **IPH SAICF** has currently consolidated itself as the largest Argentine producer of wire ropes, and one of the most important ones in Latin America. 2009 finds ourselves going through an expansion period, satisfying a big portion of the Argentine market and exporting high tech products to almost 20 countries in America, Europe and Asia.

IPH was one of the first rope factories in America that complied with ISO 9000 standard together with other prestigious certifications such as API, Lloyd's, IRAM, etc.

IPH SAICF technology makes it possible to produce a wide variety of steel ropes, including:

- Compacted ropes.
- 8 strand ropes.
- Rotation resistant wire ropes.
- Thermoplastic coated steel core ropes.
- Steel-polymer combination wire ropes.
- Extra heavy galvanized wire ropes.
- Diameters up to 80 mm and spool up to 20 ton.
- Specifically developed products for various needs.



Certifications



The quality certificate issued by IPH SACIF is supported by our quality management system under ISO 9001 and API Q1 Standards.



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