

# KEEL HOSE MANAGEMENT PRACTICE OVERVIEW

We create a registry of flexible hose assemblies (FHAs) and provide customers with the necessary information to maintain integrity during service maintenance, inspections, and replacement.

We are guided by the interests of our customers and follow their procedures and guidelines. Our Internal Company Procedure for the Hose Management and the International Industry Guidelines for the Management of Flexible Hoses by authorities such as the Energy Institute are the two most important documents we base our work on.



## OUR WORKFLOW

<b>WORKPACK PREPARATION</b>	<ul style="list-style-type: none"><li>▪ Minimized onsite time during inspection / registration.</li><li>▪ No missing hoses.</li><li>▪ Proper estimation of the scope of work and time frame.</li></ul>
<b>RED MARKING OR P&amp;ID CREATION</b>	<ul style="list-style-type: none"><li>▪ No mismatch with registered hoses;</li><li>▪ No missing hoses;</li><li>▪ Hydraulic diagram from scratch (if required).</li></ul>
<b>TAGGING</b>	<ul style="list-style-type: none"><li>▪ Cross reference between documentation / physical / ERP system (registry).</li></ul>
<b>MASTER DATA COLLECTION</b>	<ul style="list-style-type: none"><li>▪ Master data list - standard record.</li><li>▪ Stock optimization.</li></ul>
<b>DEFECTS IDENTIFICATION</b>	<ul style="list-style-type: none"><li>▪ Defect Report with recommendations in order to prevent potential risks.</li></ul>
<b>RISK ASSESSMENT</b>	<ul style="list-style-type: none"><li>▪ The evaluation is performed based on standards and customer requirements in order to minimize potential risks of idle operation, environment, and human hazards.</li></ul>
<b>MAINTENANCE PLAN</b>	<ul style="list-style-type: none"><li>▪ We create a program of planned inspections and replacement intervals based on Risk Assessment evaluation, Customer Requirements, and collected feedback from the Rig.</li></ul>
<b>CLOSEOUT REPORTS</b>	<ul style="list-style-type: none"><li>▪ Master Data List, Risk Assessment, Maintenance Plan Strategy, Red-marked Drawings, New Created Drawings.</li></ul>

## YOUR BENEFITS



# Work Pack Preparation

We prepare in advance in order to minimize the on-site time during inspection or registration.

All hose data is extracted from the available documentation and grouped by unit; in complex units, hoses are grouped by the main component.

## Based on this data, we can:

- Provide more proper estimation of the scope of work and time frame;
- Ensure no missing hoses;
- Be better organized during site work.

### GROUP FORMING

Hoses are extracted from drawings and manuals and are grouped by units. Complex units are divided into components.

### DESCRIPTION CREATION

Description of each FHA consists of Noun (hose), Medium (hydraulic, water, lubrication), and corresponding element (motor, cylinder).

### FHA TAG FORMATION

Tag numbers philosophy can be created with reference to the customer's tagging strategy:

UNIT TAG" + "Position in Drawing".

For example: 385-HPU/H010

- 385-HPU – Unit tag (Functional Aspect Reference)
- H010 – hose position on the Hydraulic Block Diagram or random FHAs numbering within the unit.



UNIT NAME	REGISTRATION TAG	Description	P & ID DRAWING	SHEET NUMBER	REV OF THE DWG	DWG POSITION
HPU	385-HPU/H001	HOSE, HYD,CIRCULATION PUMP 1,PRESS	G30XX-D1XX-H0001	1	6	110
HPU	385-HPU/H002	HOSE, HYD,CIRCULATION PUMP 2,PRESS	G30XX-D1XX-H0001	1	6	111
HPU	385-HPU/H003	HOSE, HYD,FINE FILTRATION UNIT,SUCT	G30XX-D1XX-H0001	1	6	120
HPU	385-HPU/H004	HOSE, HYD,FINE FILTRATION UNIT,RTRN	G30XX-D1XX-H0001	1	6	121
HPU	385-HPU/H005	HOSE, HYD,FINE FILTRATION UNIT,PRESS	G30XX-D1XX-H0001	1	6	122
HPU	385-HPU/H006	HOSE, HYD,MAIN PUMP 1 R(L),DRN	G30XX-D1XX-H0001	1	6	210
HPU	385-HPU/H007	HOSE, HYD,MAIN PUMP 2 R(L),DRN	G30XX-D1XX-H0001	1	6	211
HPU	385-HPU/H008	HOSE, HYD,MAIN PUMP 3 R(L),DRN	G30XX-D1XX-H0001	1	6	212
HPU	385-HPU/H009	HOSE, HYD,MAIN PUMP 1 (U),DRN	G30XX-D1XX-H0001	1	6	320
HPU	385-HPU/H010	HOSE, HYD,MAIN PUMP 2 (U),DRN	G30XX-D1XX-H0001	1	6	321

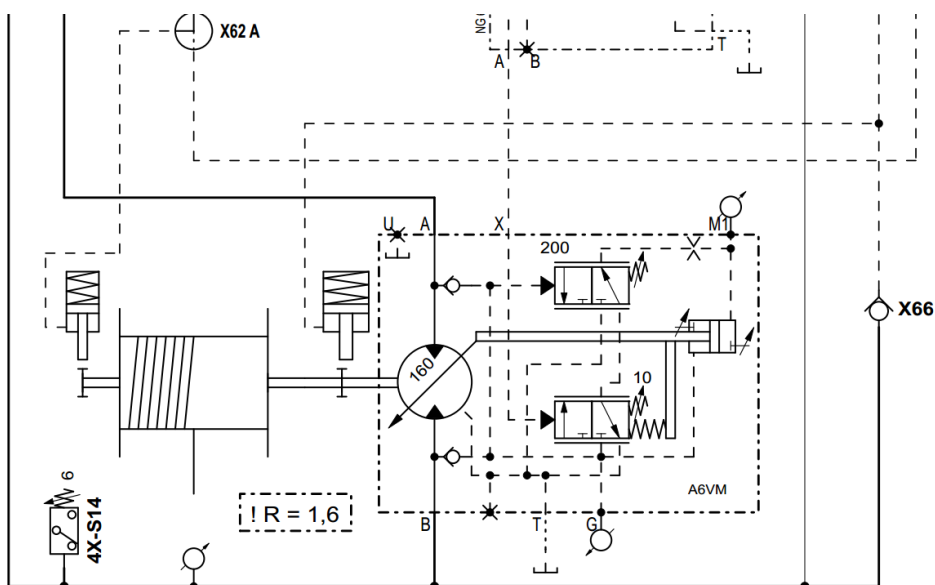
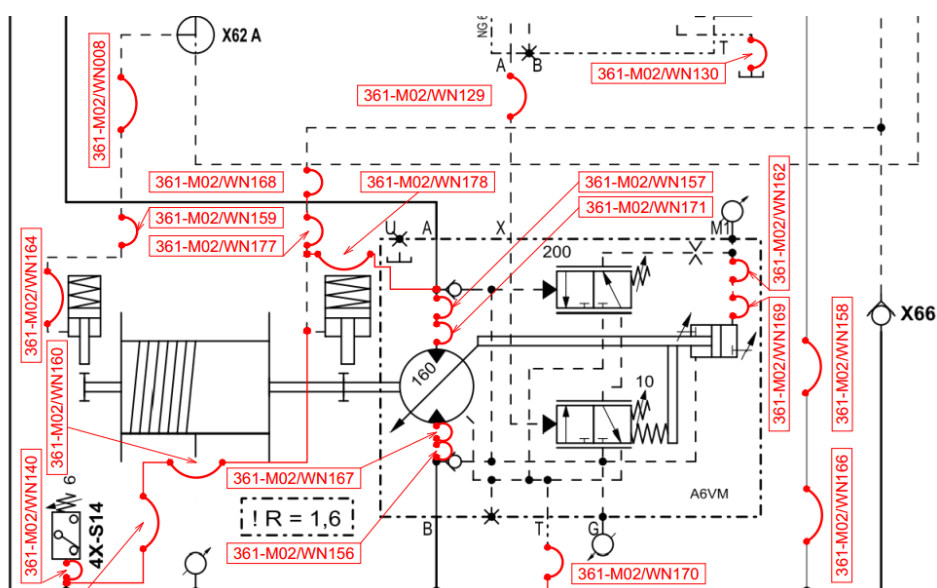
# Red Marking

In order to make sure that all hoses in scope have been verified and to avoid the creation of duplicates (for complex units), verification and registration of hose assemblies has to be performed based on hydraulic diagrams and P&ID drawings.

With the reference to drawings, we can easily classify hoses by function and pressure category (pressure, return, drain).

## Main benefits:

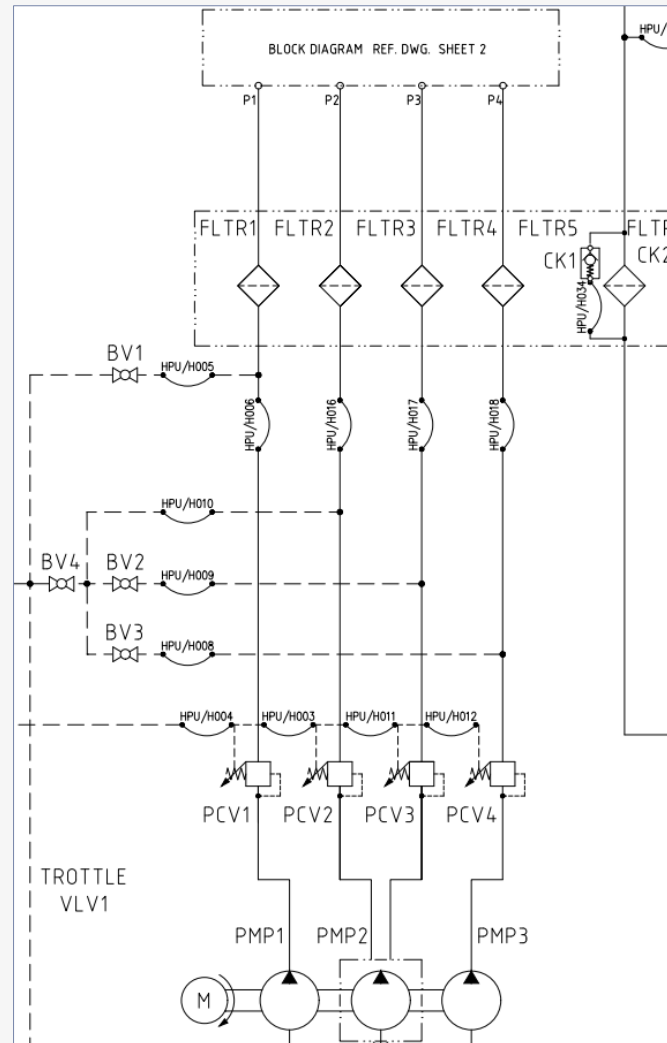
- TAG cross-reference between physical hose, drawing, ERP system;
- Proper Hose Classification - hoses are defined by function and pressure in line (pressure, control, return, drain);
- All hoses are included in the registry.





# Hydraulic Block Diagram

## Creation from scratch

If there is no available documentation, however, the Hydraulic Block Diagram is one of the project requirements, we create it from scratch.



01	31-Dec-2019	Issued for Approval	SK	PI	IP
Rev:	Date	Description	Made	Checked	Appr.
			 KEEL SOLUTION		
			Keel • Bredgade 19E, 2. th • 1260 Copenhagen K, Denmark • Tel: +45 3393 3435 • info@keelsolution.com • www.keelsolution.com		
Title:  GMR300 HYDRAULIC BLOCK DIAGRAM (CPT SYSTEM)					
Scale:	Projection: 	Size: A1	Main Part:		
Drawing Number:  GMR300.HBD			Sheet: 6/6	Revision: 01	

# Data Collection

In order to avoid vendor lock-in situation, Master Data of the flexible hose assembly is registered in a standard record:

- Hose characteristics:

- Size
- Hose type (SAE / EN / ISO)
- Working pressure

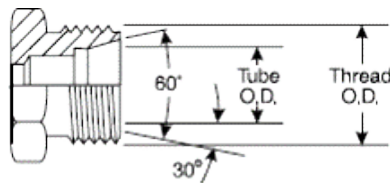
- Fittings characteristics:

- Type (JIC 37° / BSPP 60° / SAE CODE 62)

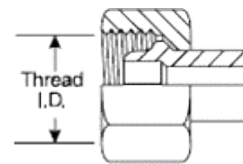
- Gender
- Degree
- Material

- Length of hose assembly
- Orientation where applicable
- Service
- If available

- Hose manufacturer
- Hose model number
- Date of manufacture



**Male**  
**60° Cone, DIN 6711**



**Female**  
**Universal 24° and 60° Cone**

END 1 TYPE	END 1 GENDER	END 1 DEGREE	END 2 TYPE	END 2 GENDER	END 2 DEGREE
JIC 37° - 04	MALE	STRAIGHT	JIC 37° - 04	FEMALE	STRAIGHT
JIC 37° - 04	MALE	STRAIGHT	JIC 37° - 04	FEMALE	STRAIGHT
JIC 37° - 04	MALE	STRAIGHT	JIC 37° - 04	FEMALE	STRAIGHT
BSPP 60° - 32	FEMALE	STRAIGHT	BSPP 60° - 32	FEMALE	90°
BSPP 60° - 32	FEMALE	STRAIGHT	BSPP 60° - 32	FEMALE	90°
BSPP 60° - 32	FEMALE	STRAIGHT	BSPP 60° - 32	FEMALE	90°
SAE CODE 62 - 3/4"	FEMALE	STRAIGHT	BSPP 60° - 12	FEMALE	STRAIGHT
SAE CODE 62 - 3/4"	FEMALE	STRAIGHT	BSPP 60° - 12	FEMALE	STRAIGHT
(16S) - M24x1,5	FEMALE	STRAIGHT	(16S) - M24x1,5	FEMALE	90°
(16S) - M24x1,5	FEMALE	STRAIGHT	(16S) - M24x1,5	FEMALE	45°



Hose  
Name

Part / Model  
Number

Working  
Pressure

I.D.

Hose  
Type



# Defects Detection

## Result of external visual integrity inspection:

Keel provides recommendations to the existing design to **improve service life, operability or serviceability.**

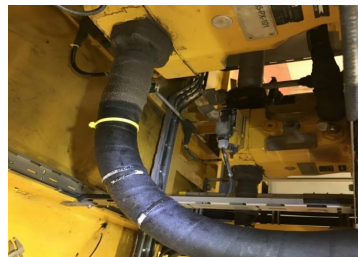
All the identified defects are recorded into the Defect Report and Defect List with recommendations.



Cracks



Blisters



Over bending



Damages



### Inspection Report

No. 317-MJ1-AHX-H400

#### EQUIPMENT INFORMATION

Equipment Tag No.	317-MJ1-AHX-H400
Main Unit	UTILITY SKID NO 1
Description	HOSE, HYD, VLV H28 (U2), CLAMP CTRL

#### INSPECTION CRITERIA

Check	Confirm The Following:	OK	DEFECT	N/A
1	Hose condition		X	
2	Fittings condition	X		
3	Hose assembly routing	X		

#### Defect:

Cracks

#### Recommendation:

Replace

#### Pictures:



## Defect List

S/N	UNIT NAME	DEFECT	REGISTRATION TAG	DESCRIPTION	P & ID DRAWING	SIZE/DIME NO.	WORKING PRESSURE	LENGTH	END 1 TYPE	END 1 GENDER	END 1 DEGREE	END 1 FITTINGS MATERIAL	END 2 TYPE	END 2 GENDER	END 2 DEGREE
341	HYDRAPACKER IV AUX	Cracks	341-PP52-AHX-2H300	HOSE, HYD ADJUST CYL PROP VLV (B2)	G2009-D1213-H0002	3/8"	350BAR	approx 5000MM	(125) - M20x1.5	FEMALE	STRAIGHT	CARBON STEEL	(125) - M20x1.5	FEMALE	45°
342	HYDRATONIC API-200 WELL CENTER	Cracks, Over bending	342-HP10-AHX-1LH17	HOSE, AIR DIPOLE WTR SPRAY (4 x)	G2009-D1243-H0011	1/2"	310BAR	3000MM	(165) - M24x1.5	FEMALE	STRAIGHT	CARBON STEEL	(165) - M24x1.5	FEMALE	90°
305	HPU FOR EQUIPMENT IN MOONPOOL	Blisters	305-HPU3-AHX-1LH01	HOSE, HYD MAIN PUMP 2, PRESS	G2095-D1110-H0001	1-1/2"	310BAR	1210MM	(165) - M24x1.5	FEMALE	90°	CARBON STEEL	SAE CODE 62 - 1-1/4"	FLANGE	STRAIGHT
364	X - MAS TREE GUIDE & SEAFIXING NO 1	Mechanical damage	364-MSL-AHX-H504	HOSE, HYD CYL 1, UPP GUIDE EXTEND	G2060-D1166-H0002	1/2"	310BAR	1340MM	(165) - M24x1.5	FEMALE	STRAIGHT	CARBON STEEL	(165) - M24x1.5	FEMALE	90°
325	HYD PUMPS	Cracks	325-AHX-AHX-1H420	HOSE, AIR PSY CTRL LINA	1007010-SC4-D05	1/2"	176BAR	1150MM	NPT - 08	MALE	STRAIGHT	BRONZE	NPT - 08	MALE	STRAIGHT
337	BOF TEST STUMP RETRACTOR NO 1	Cracks	331-BOP9-700-AHX-1H501	HOSE, HYD BUNDLE LIFTING CYLS EXTEND	G2061-D1217-H0001	1"	200BAR	5000MM	(255) - M36x2.0	FEMALE	STRAIGHT	CARBON STEEL	(255) - M36x2.0	FEMALE	STRAIGHT
337	BOF TEST STUMP RETRACTOR NO 1	Cracks	331-BOP9-700-AHX-1H505	HOSE, HYD BUNDLE LIFTING CYLS EXTEND	G2061-D1217-H0001	1/2"	310BAR	5000MM	(165) - M24x1.5	FEMALE	STRAIGHT	CARBON STEEL	(165) - M24x1.5	FEMALE	STRAIGHT
341	HYDRAPACKER IV AUX	Cracks	341-PP52-AHX-2H301	HOSE, HYD ADJUST CYL PROP VLV (A1)	G2009-D1213-H0002	3/8"	350BAR	approx 5000MM	(125) - M20x1.5	FEMALE	STRAIGHT	CARBON STEEL	(125) - M20x1.5	FEMALE	45°
341	HYDRAPACKER IV AUX	Cracks	341-PP52-AHX-2H302	HOSE, HYD HEAD CLAW CYL PROP VLV (B4)	G2009-D1213-H0002	3/8"	350BAR	approx 5000MM	(125) - M20x1.5	FEMALE	STRAIGHT	CARBON STEEL	(125) - M20x1.5	FEMALE	45°
341	HYDRAPACKER IV AUX	Cracks	341-PP52-AHX-2H303	HOSE, HYD HEAD CLAW CYL PROP VLV (A4)	G2009-D1213-H0002	3/8"	350BAR	approx 5000MM	(125) - M20x1.5	FEMALE	STRAIGHT	CARBON STEEL	(125) - M20x1.5	FEMALE	45°
341	HYDRAPACKER IV AUX	Cracks	341-PP52-AHX-2H306	HOSE, HYD PIPE PUSHER CYL PROP VLV (B3)	G2009-D1213-H0002	3/8"	350BAR	approx 5040MM	(125) - M20x1.5	FEMALE	STRAIGHT	CARBON STEEL	(125) - M20x1.5	FEMALE	45°
341	HYDRAPACKER IV AUX	Cracks	341-PP52-AHX-2H307	HOSE, HYD PIPE PUSHER CYL PROP VLV (A3)	G2009-D1213-H0002	3/8"	350BAR	approx 5040MM	(125) - M20x1.5	FEMALE	STRAIGHT	CARBON STEEL	(125) - M20x1.5	FEMALE	45°
341	HYDRAPACKER IV AUX	Cracks	341-PP52-AHX-7H505	HOSE, HYD ELEVATOR CTRL VLV (B2)	G2009-D1213-H0007	3/8"	350BAR	approx 5200MM	(125) - M20x1.5	FEMALE	STRAIGHT	CARBON STEEL	(125) - M20x1.5	FEMALE	STRAIGHT
341	HYDRAPACKER IV AUX	Cracks	341-PP52-AHX-7H507	HOSE, HYD ELEVATOR CTRL VLV (A2)	G2009-D1213-H0007	3/8"	350BAR	approx 5250MM	(125) - M20x1.5	FEMALE	STRAIGHT	CARBON STEEL	(125) - M20x1.5	FEMALE	STRAIGHT
341	HYDRAPACKER IV AUX	Cracks	341-PP52-AHX-7H509	HOSE, HYD ELEVATOR CTRL VLV (B1)	G2009-D1213-H0007	3/8"	350BAR	approx 5600MM	(125) - M20x1.5	FEMALE	STRAIGHT	CARBON STEEL	(125) - M20x1.5	FEMALE	STRAIGHT
341	HYDRAPACKER IV AUX	Cracks	341-PP52-AHX-7H521	HOSE, HYD ELEVATOR CTRL VLV (B1)	G2009-D1213-H0007	3/8"	350BAR	approx 5180MM	(125) - M20x1.5	FEMALE	STRAIGHT	CARBON STEEL	(125) - M20x1.5	FEMALE	STRAIGHT
341	HYDRAPACKER IV AUX	Cracks	341-PP52-AHX-7H522	HOSE, HYD ELEVATOR CTRL VLV (A1)	G2009-D1213-H0007	3/8"	350BAR	approx 5200MM	(125) - M20x1.5	FEMALE	STRAIGHT	CARBON STEEL	(125) - M20x1.5	FEMALE	STRAIGHT
341	HYDRAPACKER IV AUX	Cracks	341-PP52-AHX-7H523	HOSE, HYD ELEVATOR CTRL VLV (A5)	G2009-D1213-H0007	3/8"	350BAR	approx 7780MM	(125) - M20x1.5	FEMALE	STRAIGHT	CARBON STEEL	(125) - M20x1.5	FEMALE	STRAIGHT

# Risk Assessment & Maintenance Plan

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The main purpose of carrying out a Risk Assessment and creating a Maintenance plan is to **identify**, **evaluate**, and **prevent** the probability of any risk caused by the use of flexible hose assembly and to classify flexible hose assembly by risk category, as well as ensure that risk reduction measures have been taken.

Based on Risk Assessment evaluation, Customer Requirements, and Collected Feedback from the Rig, we create a program for planned inspections and replacement intervals.

During onsite registration, hoses are additionally evaluated and grouped by replacement strategy:

- replacement during operation;
- replacement during yard-stay / rig-move / standby (drag chains, problematic with access, requiring additional unit disassembly).

## RISK CATEGORIES

### SAFETY

Probability of human injury in places close to walkways and safety-critical units:

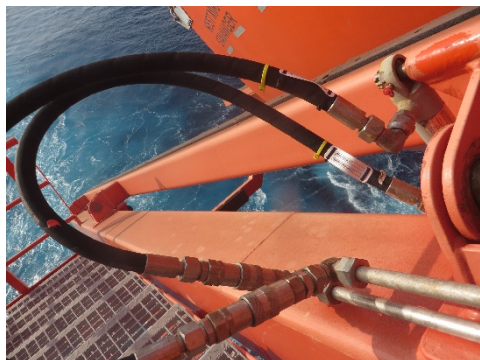
- Fire Fighting System (Foam, Inergen, Water Mist)
- Personal evacuation (Davit for Life/Rescue Boats)

### ENVIRONMENTAL IMPACT

Potential of direct leakage to the sea from Equipment / Units located above the sea (Moonpool Area, Cellar Deck, etc.)

### IDLE OPERATION

Equipment criticality process evaluates and ranks the equipment based on the most probable failure frequency and consequence based on the customer guidelines, procedures, internal guides, and experience.



Environmental danger



Human danger



Learn more about our Hose Management Services >>