Design Report
Pumping Stations at CP3 & CP4

6515-695-163-REP-001

In Accordance with Water Licence 2AM-MEL1631

Prepared by:
Agnico Eagle Mines Limited – Meliadine Division

DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Revision
1	2018-10-10			Design report

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Environment Superintendent

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1 INTRODUCTION

1.1 SITE LOCATION AND ACCESS

Agnico Eagle Mines Limited (Agnico Eagle) is developing the Meliadine Project (the Project), a gold mine located approximately 25 km north of Rankin Inlet, and 80 km southwest from Chesterfield Inlet in the Kivalliq Region of Nunavut. The project site is located on the peninsula between the East, South, and West basins of Meliadine Lake (63°01'23.8"N, 92°13'6.42"W). The area is accessible from the all-weather gravel road linking the Meliadine mine site with Rankin Inlet.

1.2 SITE FACILITIES

The current mine plan focuses on the development of the Tiriganiaq gold deposit which will be mined using both conventional open-pit and underground mining operations. Current or proposed mining facilities to support this development include a plant site and accommodations, tailings storage facility and water management infrastructures.

Several infrastructures such as water retention dikes, berms, culverts, channels, collection ponds, pumping stations, fresh water intake and water treatment plants are required to manage water during pre-production, operation, and interim mine closure.

Facilities that are planned to be constructed for the operation of the future Meliadine Mine include a process plant, power plant, maintenance facilities, tank farms for fuel storage, water treatment plant, sewage treatment plant, saline water treatment plant, accommodations, and kitchen facilities for 520 people.

The Nunavut Water Board (NWB) has issued Type “A” Water License No. 2AM-MEL1631 (Water license “A”) to Agnico Eagle Mines Limited (Agnico Eagle) for the Meliadine Gold Project site authorizing the use of water and the disposal of waste required by mining and milling and associated uses.

Appendix A presents the location of the future pumping stations at collection ponds CP3 and CP4 including the pipeline between the ponds and their respective pumping station, then to the discharge point (H13) which drains to the site’s collection pond named CP1.

1.3 PURPOSE OF DOCUMENT

This report includes the final design and construction drawings (Appendix B) for the pumping stations at CP3 and CP4 including the pipelines between the ponds and their respective pumping station as well as between the pumping stations and their discharge point in H13 which drains to CP1.

2 DESIGN BASIS

The overall site wide water management plan was described in Meliadine Gold Project Water Management Plan (Agnico Eagle 2015). Under the current water management plan, permanent pumping stations CP3 and CP4 are required in Year 1 to transfer the surface runoff water collected in their respective collecting ponds (CP3 and CP4)[1] to CP1 sub-watershed every year, during the mine development, from spring freshet to October.

The water level in the ponds will be monitored and controlled by an operator who will start and stop the pumps manually.

The daily pumping rate for each of the ponds is designed to have sufficient pumping capacity to handle the runoff water, which would result from one day (24.4 mm) of a 1:100 return wet spring freshet plus a 1:2 return one-hour rainfall (9.8 mm).

2.1 OPERATION PLAN

The following sections summarise the operation plans for CP3 and CP4 areas.

2.1.1 CP3

- CP3 will serve as a water collection pond to collect the runoff water from the Tailings Storage Facility (TSF) catchment, and a temporary water storage area. A water pumping system will be installed in CP3 to manage the water in CP3. The runoff water collected by Channel3 will be diverted into CP3.

- During the annual spring freshet, the first 3 days of freshet water will be stored in CP3 in order to prepare the pumping system. The water collected in CP3 will be actively pumped to partially drained Lake H13 where it will naturally flow into Channel1 and eventually CP1 (the final site-wide contact water collection pond) from the fourth day of spring freshet and water in CP3 will be completely pumped out within seven days.

- Minimal water will be stored in CP3 after the spring freshet water is pumped out, so that the runoff from an extreme rainfall event can be temporarily stored in CP3.

- No water will be discharged from CP3 directly to the outside downstream receiving environment during operation.

2.1.2 CP4

- CP4 will serve as a water collection pond to collect the runoff water from the Waste Rock Storage Facility 1 (WRSF1) catchment, and a temporary water storage area. A water pumping system will be installed in CP4 to manage the water in CP4.

- The runoff water collected by Channel4 will be diverted into CP4.

[1] Information regarding design of CP3 and CP4 collecting ponds and associated channels and berms are presented in Design Report 6515-E-132-REP-132-017.

- During the annual spring freshet, the first 3 days of freshet water can be stored in CP4 in order to prepare the pumping system. The water collected in CP4 will be actively pumped to partially drained Lake H13 from the fourth day of spring freshet and water in CP4 will be completely pumped out within seven days.

- Minimal water will be stored in CP4 after the spring freshet water is pumped out, so that the runoff from an extreme rainfall event can be temporarily stored in CP4.

- No water will be discharged from CP4 directly to the outside downstream receiving environment during operation.

2.2 PRECIPITATION, SURFACE RUNOFF, AND LAKE SURFACE EVAPORATION

Surface runoff parameters for a mean precipitation year and a 1/100 wet precipitation year are presented in Table 1 and Table 2 respectively. These parameters were derived based on the measured precipitation data at Rankin Inlet Station and adopted from the feasibility study (Tetra Tech EBA 2014).

Table 1: Various Parameters for Surface Runoff Estimation for a Mean Precipitation Year

Item	Value
Total adjusted annual precipitation for a mean precipitation year	412 mm
Total adjusted annual rainfall for a mean precipitation year	210 mm
Total adjusted annual water equivalent snowfall for a mean precipitation year	202 mm
Total estimated snow sublimation	99 mm
Estimated snow melt water equivalent in spring freshet	103 mm
24-hour duration rainfall with a 1 in 2 years of return period	33 mm
Monthly rainfall distribution	16% in June, 21.2% in July 30.8% in August, 24.5% in September 7.5% in October
Annual net runoff on natural on-land surface for a mean precipitation year	215 mm (127 mm in June, 22 mm in July, 32 mm in August, 26 mm in September, and 8 mm in October)
Estimated monthly lake (non-saline water) surface evaporation	60 mm in June, 125 mm in July 96 mm in August, 42 mm in September
Annual net runoff on lake surface for a mean precipitation year	-10 mm (76 mm in June, -80 mm in July, -31 mm in August, 9 mm in September, and 16 mm in October)
Estimated monthly natural land surface evapotranspiration	6 mm in June, 14 mm in July 11 mm in August, 5 mm in September
Annual net runoff on disturbed land surface for a mean precipitation year	251 mm (133 mm in June, 36 mm in July, 43 mm in August, 31 mm in September, and 8 mm in October)

Table 2: Various Parameters for Surface Runoff Estimation for a 1 in 100 Extreme Wet Year and Extreme Rainfall

Item	Value
Total adjusted annual precipitation for a 1 in 100 wet precipitation year	594 mm
Total adjusted annual rainfall for a 1 in 100 wet precipitation year	324 mm
Total adjusted annual water equivalent snowfall for a 1 in 100 wet precipitation year	270 mm
Total estimated snow sublimation	99 mm
Estimated snow melt water equivalent in spring freshet for a 1 in 100 wet precipitation year	171 mm [(a)]
Monthly rainfall distribution	16% in June, 21.2% in July 30.8% in August, 24.5% in September 7.5% in October
Annual net runoff on natural on-land surface for a 1 in 100 wet precipitation year	430 mm (213 mm in June, 55 mm in July, 80 mm in August, 63 mm in September, and 19 mm in October)
Estimated monthly lake surface (non-saline water) evaporation	60 mm in June, 125 mm in July 96 mm in August, 42 mm in September
Annual net runoff on lake surface for a 1 in 100 wet precipitation year	172 mm (163 mm in June, -56 mm in July, 4 mm in August, 37 mm in September, and 24 mm in October)
Estimated monthly natural land surface evapotranspiration	6 mm in June, 14 mm in July 11 mm in August, 5 mm in September
Annual net runoff on disturbed land surface for a 1 in 100 wet precipitation year	466 mm (219 mm in June, 69 mm in July, 91 mm in August, 68 mm in September, and 19 mm in October)
5-min duration extreme rainfall with a 1 in 100 years of return period	5.0 mm [(b)]
30-min duration extreme rainfall with a 1 in 100 years of return period	12.9 mm
24-hour duration extreme rainfall with a 1 in 100 years of return period	65 mm
24-hour duration extreme rainfall with a 1 in 1,000 years of return period	77 mm
24-hour duration PMP (probable maximum precipitation)	259 mm
Runoff coefficient for extreme rainfall	1.0

Note: [(a)]Used for CP3 and CP4 design. [(b)]Used for Channel3 and Channel4 design

2.3 PUMPS

Each pumping station is equipped with one (1) auto prime pump with 250hp diesel motor assembled on skid. Each pump will be connected to a 1000-gallons (4,500 liters) fuel tank. Furthermore, in order to completely empty the ponds at the end of the pumping season, a Tsurumi electrical submersible pump equipped with a flotation module will be used sequentially at each pond.

The amount of water to pump from each area will be the same throughout the life of mine. For CP3 pumping system, the design operating water pumping rate is 9,400 m^3/day whereas for CP4 pumping system, it is 11,000 m^3/day.

The pump specifications including flotation module and pumping curves are presented in Appendix C.

2.4 PUMPING STATIONS ENCLOSURES

Mechanical pumping stations equipment will be housed in an enclosure. The enclosure has been designed following the site information and design coefficients (temperature, wind load, snow load, etc.) from the Agnico Eagle general guidelines to resist to the Nunavut climatic conditions. The enclosure will be installed on a leveled coarse compacted gravel surface. Enclosure walls will be painted in accordance with Agnico Eagle requirements to ensure good corrosion resistance over the years of operation.

2.5 PIPING

All pipelines and flanges are made of high quality pipe HDPE DR17 PE4710. Black HDPE was chosen for its high sunlight Ultraviolet resistance, supported by technical literature stating a life expectancy of 50-100 years of successful service.

The pumping stations will transfer water to H13 through a total of 2.5 km of sections of 300 mm (Ø12 inch) and a section of 400 m of 400 mm (Ø16 inch) HDPE pipes. Table 3 presents a summary of the three (3) pipelines.

Table 3: Pipelines between CP3 and CP4 pumping stations and discharge point (H13)

Description	Length (m)	Diameter (mm)
CP3 to CP3_CP4 connection	1250	300
CP4 to CP3-CP4 connection	1250	300
CP3-CP4 connection to H13	1600	400

The pipelines will be butt welded using a fusion welding machine and in accordance with standard practices (ASTM F2620, Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings). All pipelines flanges (stub-ends) are made of the same material as the pipelines, with a pressure rating class 150 lbs and comply with ANSI B16.5 dimensions for perfect mating and minimizing risks of leaks.

The pipeline centerline routing is straight but the pipeline is designed to snake along its general path. This is required to give free movement of the pipelines under the Nunavut high outdoor temperature range and to limit the induced thermal expansion stress.

The pipelines lie directly on the tundra where sharp stones will be removed before installation to reduce the risks of tears and premature wear. Since the pipelines will be water tight, no hazards or disturbances are expected after installation. A service test will be performed on the piping for leak detection.

Pipeline discharge on the shore of H13 will lie on a protective bedding of either rip-rap or other non-erodible backfill material to avoid erosion at the discharge point.

2.6 CONTROLS

The pumping stations have been designed to provide easy operation and maintenance. The equipment will be locally controlled at the pumping station.

Appendix A: Location of CP3 and CP4 pumping stations

NO. DESSIN
DRAWING NO. 65-000-270-200_R5

FORMAT ARCHD

692 – FRESH WATER PUMPING STATION

FRESH WATER
ø200mm DR17
HT= 2 CANAUX
INS= 2,5po
APPROX. LENGTH : 978m

425 – ARTIC CORRIDORS

407 – POWER PLANT

RECYCLED WATER
ø50mm DR17
HT= ø
INS= ø
APPROX. LENGTH : 765m

FINAL WATER TREATMENT
INFORMATION TO COME

524 – PROCESS PLANT

407 – FINALE
WATER TREATMENT PLANT

CHANNEL 1

PUMPING STATION

HDPE ø14"
HOT WATER
TO UNDERGROUND

COMBINED PUMPED WATER
ø400mm[16"] HDPE DR17
TOTAL APPROX. LENGTH : 650m

HOT AND COLD WATER
ø355mm DR11
HDPE INSULATED
APPROX. LENGH: 3691m

PUMPED WATER
ø300mm[12"] HDPE DR17
TOTAL APPROX. LENGTH : 3100m

FRESH WATER TO PASTE PLANT
ø80mm DR11 & DR17
HT= 1 CANAL
INS= 2,5"
APPROX. LENGTH : 1540m X2

PIPE 1-1/2" HDPE DR11,
2.5" INSULATION WITH HEAT TRACING,
TREATMENT PLANT TO CP1

PIPE 4" HDPE DR11, 2.5"
INSULATION WITH HEAT TRACING
PASTE FLUSHING WATER

SALINE WATER
STORAGE / TRANSFER
POND / BERM

SALT WATER TANK

584 – PASTE PLANT

PIPE 2" HDPE DR11,
2.5" INSULATION
WITH HEAT TRACING

PIPE 4" HDPE DR11, 2.5"
INSULATION WITH HEAT TRACING
SALINE WATER TREATMENT PLANT
TO SALT POND

HOT WATER TO PASTE PLANT
ø80mm DR17
HT= ø
INS= 2,5"
APPROX. LENGTH : 330m

PIPE 4" HDPE DR11, 2.5"
INSULATION WITH HEAT TRACING
PASTE FLUSHING WATER

PIPE 4" HDPE DR11, 2.5"
INSULATION WITH HEAT TRACING
SALINE WATER TREATMENT PLANT
TO SALT POND, OR SALT WATER
TANK FOR PASTE PLANT

PASTE LINE HOLES

681 – SALINE WATER
TREATMENT PLANT

444 - VENTILATION &
EMERGENCY EGGRESS
(INTAKE)

PUMPING STATION

H15L H15K H15G H15H H15F H15D H15 H15B H14A H14 H13A H13D H13C H13 H12 H11 H10 H9 H8 H7 H17C H17B H17 CP1 H18 H16 H1 H2 H3 H4 H5 H6 H19 CP6 H20 G2 B28 CP3 5 B7 B6 4 A58 A17 A56 A16 A15 A14 A13 A12 A11 A54 CP5 4 B30 B31 B32 B33 B5 B8 CP4 B9 5 B10 B33A A39

PLAN CLÉ
KEY PLAN

WSP
1075, 3e AVENUE EST
VAL-D'OR (QUÉBEC) CANADA J9P 0J7
TÉL. : 819 825-4274 | TÉLÉC. : 819 824-1514 | WWW.WSPGROUP.COM

Ref. 151-06440-40

NOTES GÉNÉRALES / GENERAL NOTES

LEGEND

- ARCHEOLOGICAL SITE MITIGATED
- ARCHEOLOGICAL SITE STAKED
- ARCHEOLOGICAL SITE NOT MITIGATED
- WORKING POINT

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-09-26

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
INDUSTRIAL SITE - GROUND LEVELING / FINISHED GRADE ELEVATION	65-000-230-207_RD
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
5	2018-09-26	REVISION FOR CP3 & CP4	I.G.	B.F.	
4	2018-09-06	PIPING ROUTING UPDATE	I.G.	B.F.	
3	2018-07-17	PIPING ROUTING UPDATE	I.G.	B.F.	
2	2018-06-22	ADD PIPING TO SWTP	C.G.	B.F.	
1	2018-05-18	REVISION PIPING CP3-CP4	B.F.	B.F	
0	2018-03-02	ISSUED FOR CONSTRUCTION	P.ST-J	B.F.	

REVISIONS

TITRE / TITLE
AGNICO EAGLE – MÉLIADINE DIVISION
000 – GENERAL
270 – PIPING
WATER PIPE ROUTING
PLAN VIEW

DESSINÉ PAR DRAWN BY	PHILIPPE ST-JACQUES	DATE 2018-03-01
VÉRIFIÉ PAR CHECKED BY	DOMINIQUE RICHARD, Eng.	2018-03-01
APPROUVÉ PAR APPROVED BY	BERTRAND FORTIN, P. Eng.	2018-03-02
ÉCHELLE SCALE	1:5000	DATE 2018-03-01
NO. DESSIN DRAWING NO.	65-000-270-200	
NO. PROJET PROJECT NO.	6515	REVISION 5 / FEUILLE / SHT 1 / 1

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Appendix B: Design Drawings

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DRAWING NO. 65-695-210-204_R0

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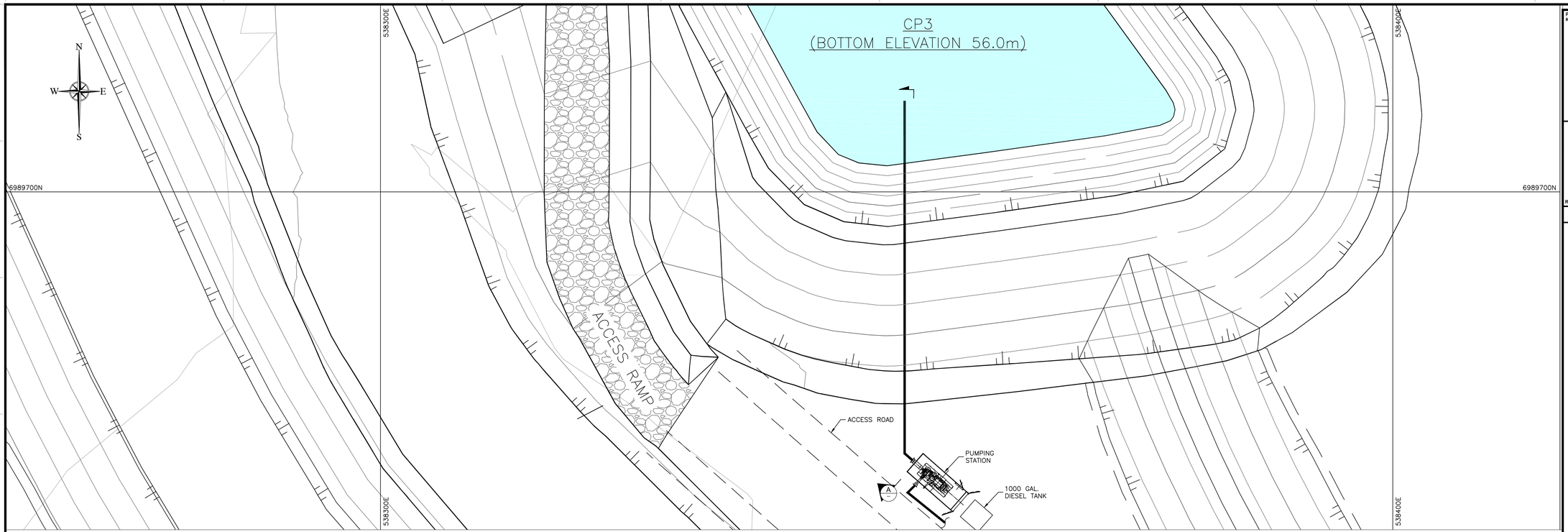

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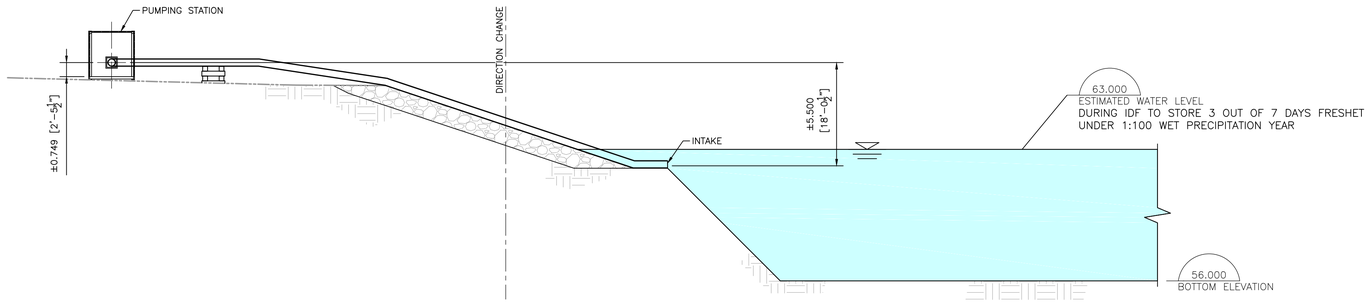

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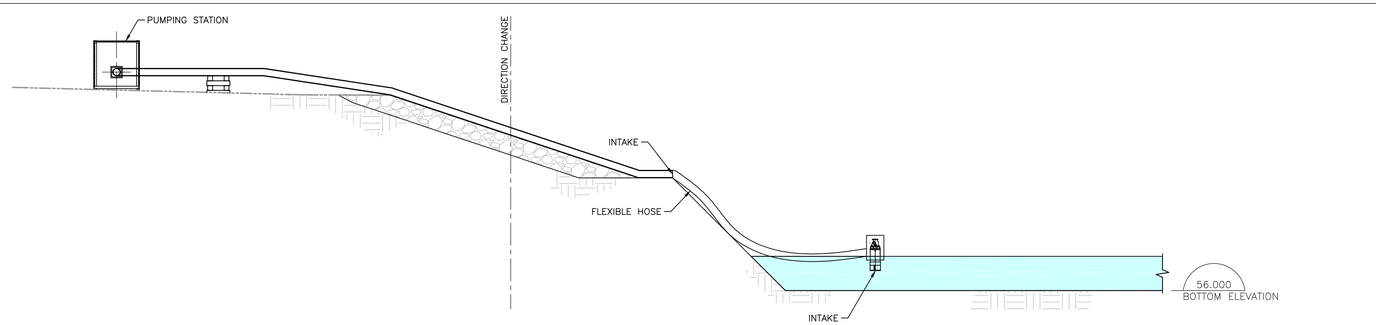

SECTION – POND DRAINAGE BEFORE WINTER A
SCL: 1:150

PLAN CLÉ
KEY PLAN

WSP
1075, 3e AVENUE EST
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Réf. 151-06440-10

NOTES GÉNÉRALES / GENERAL NOTES

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-09-25

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
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B	2018-09-18	REVISION FOR COMMENTS	I.G.	–	
A	2018-09-06	ISSUED FOR COMMENTS	I.G.	–	

REVISIONS

REGISTERED PROFESSIONAL ENGINEER
D. SÉGUIN
LICENSEE
NT/NU

TITRE / TITLE
AGNICO EAGLE – MELIADINE DIVISION
695 – WATER MGMT
(SITE DRAINAGE & SETTLING POND)
210 – GENERAL ARRANGEMENT
CP3 LEVEL CONTROL

DESSINÉ PAR / DRAWN BY	ISABELLE GILBERT	DATE 2018-08-24
VÉRIFIÉ PAR / CHECKED BY	DANIEL SÉGUIN, P. Eng.	2018-09-25
APPROUVÉ PAR / APPROVED BY	DANIEL SÉGUIN, P. Eng.	2018-09-25
ÉCHELLE / SCALE	INDICATED	DATE 2018-08-24
NO. DESSIN / DRAWING NO.	65-695-210-204	
NO. PROJET / PROJECT NO.	6515	REVISION 0 / FEUILLE / SHT 1 / 1

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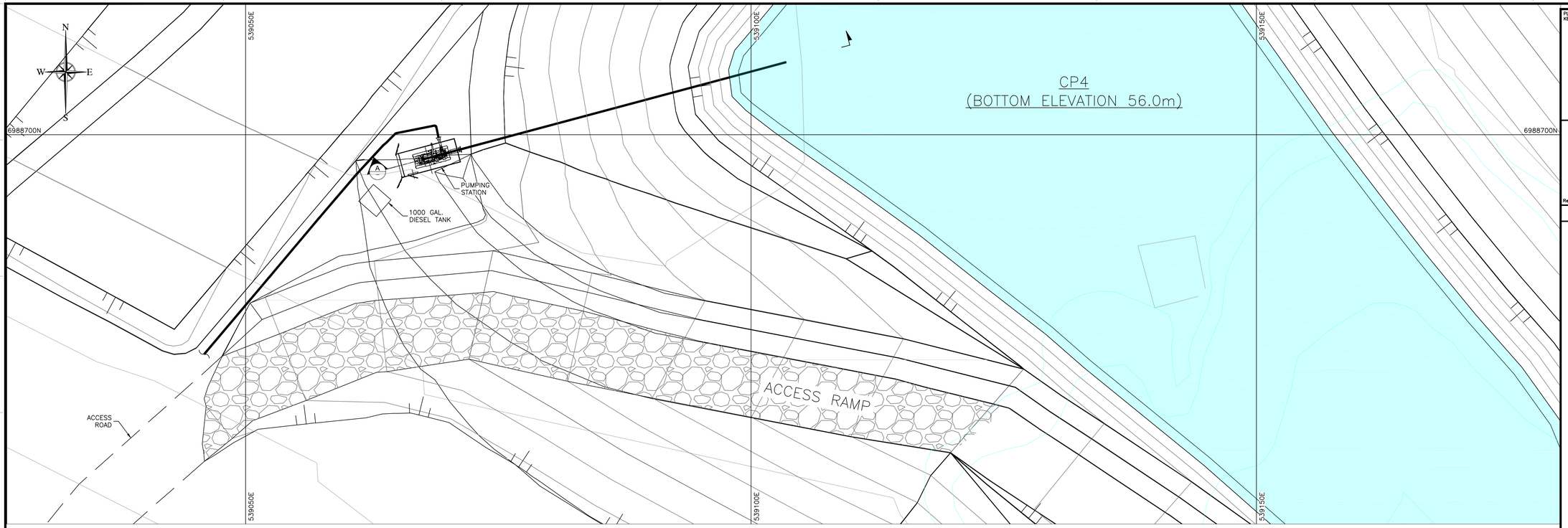

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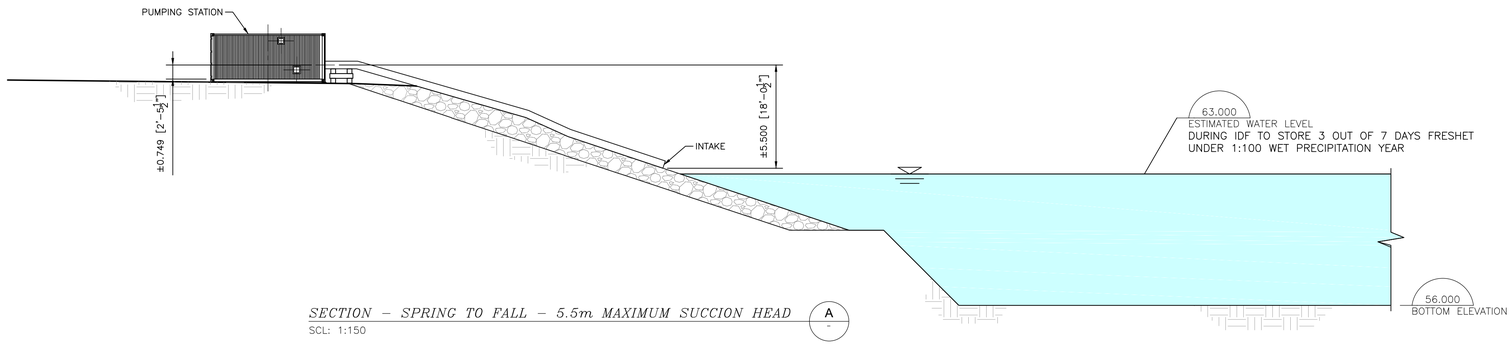

SECTION – SPRING TO FALL – 5.5m MAXIMUM SUCCION HEAD A
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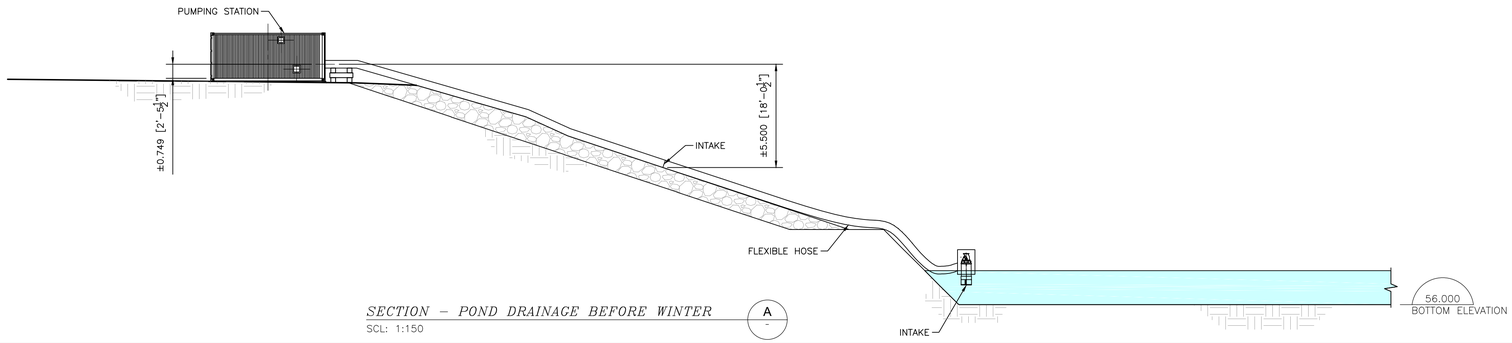

SECTION – POND DRAINAGE BEFORE WINTER A
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PLAN CLÉ
KEY PLAN

WSP
1075, 3e AVENUE EST
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Ref. 151-06440-10

NOTES GÉNÉRALES / GENERAL NOTES

POUR CONSTRUCTION
FOR CONSTRUCTION
AGNICO EAGLE
DATE : 2018-09-25

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
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AGNICO EAGLE

REV.	DATE	DESCRIPTION	PAR/BY	APP.	CLIENT
0	2018-09-25	ISSUED FOR CONSTRUCTION	I.G.	D.S.	
B	2018-09-18	REVISION FOR COMMENTS	I.G.	–	
A	2018-09-06	ISSUED FOR COMMENTS	I.G.	–	

REVISIONS

REGISTERED PROFESSIONAL ENGINEER
D. SÉGUIN
LICENSEE
NT/NU

TITRE / TITLE
AGNICO EAGLE – MELIADINE DIVISION
695 – WATER MGMT
(SITE DRAINAGE & SETTLING POND)
210 – GENERAL ARRANGEMENT
CP4 LEVEL CONTROL

DESSINÉ PAR / DRAWN BY	ISABELLE GILBERT	DATE 2018-08-24
VÉRIFIÉ PAR / CHECKED BY	DANIEL SÉGUIN, P. Eng.	2018-09-25
APPROUVÉ PAR / APPROVED BY	DANIEL SÉGUIN, P. Eng.	2018-09-25
ÉCHELLE / SCALE	INDICATED	DATE 2018-08-24
NO. DESSIN / DRAWING NO.	65-695-210-205	
NO. PROJET / PROJECT NO.	6515	REVISION 0 / FEUILLE / SHT 1 / 1

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Appendix C: Pumps & flotation module specifications and pumping curves

Technosub

INDUSTRIAL **PUMPS**
DEWATERING SOLUTIONS

8TSHAP

STANDARD HIGH HEAD AUTO PRIME

Technosub® Standard High Head Auto Prime pumps are specifically designed to effectively handle a wide range of liquids in applications such as liquid transfer, wash down, fire protection, fracking and jetting where high heads and pressure are required.

Technosub Standard High Head Auto Prime pumps provide a dependable, highly efficient solution in a completely automatic priming pump.

The model 8TSHAP is capable of achieving maximum flows of 3500 gpm (794 m^3/h) and maximum total head of 340' (103 m), with solids handling up to 1-3/8" (35 mm) in diameter.

The standard 8TSHAP is powered by a water-cooled, 6-cylinder diesel engine. Alternative drives are available, including other diesel engines or electric motor options.

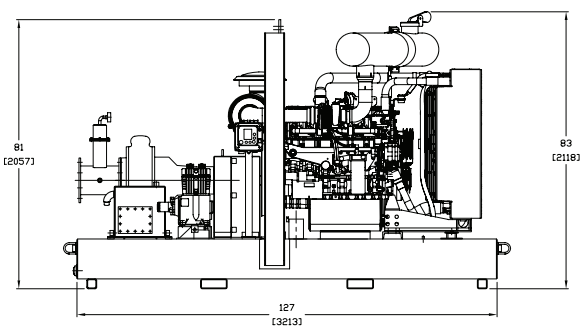
FEATURES

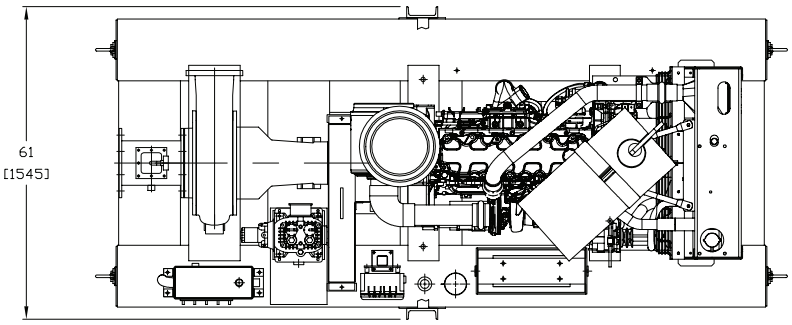
- Technosub's rugged, heavy duty pumps are engineered specifically for portable application
- Fully automatic priming system allows the pump to prime and re-prime while running
- Compressor-fed, venturi priming system provides rapid, reliable priming
- Fully guarded coupling
- Mechanical seal with biodegradable glycol quench allows the pump to start and run dry
- Non-return valve uses only a single moving part to allow full flow with minimal restriction
- Pump casings are hydrostatically tested to 50 psig (345 kPa) above the peak casing design pressure
- Standard engine control panel provides preset emergency shutdown protection and allows the addition of automatic level control
- Skid-mounted format with integral fuel tank, tie downs, lifting bail and fork pockets

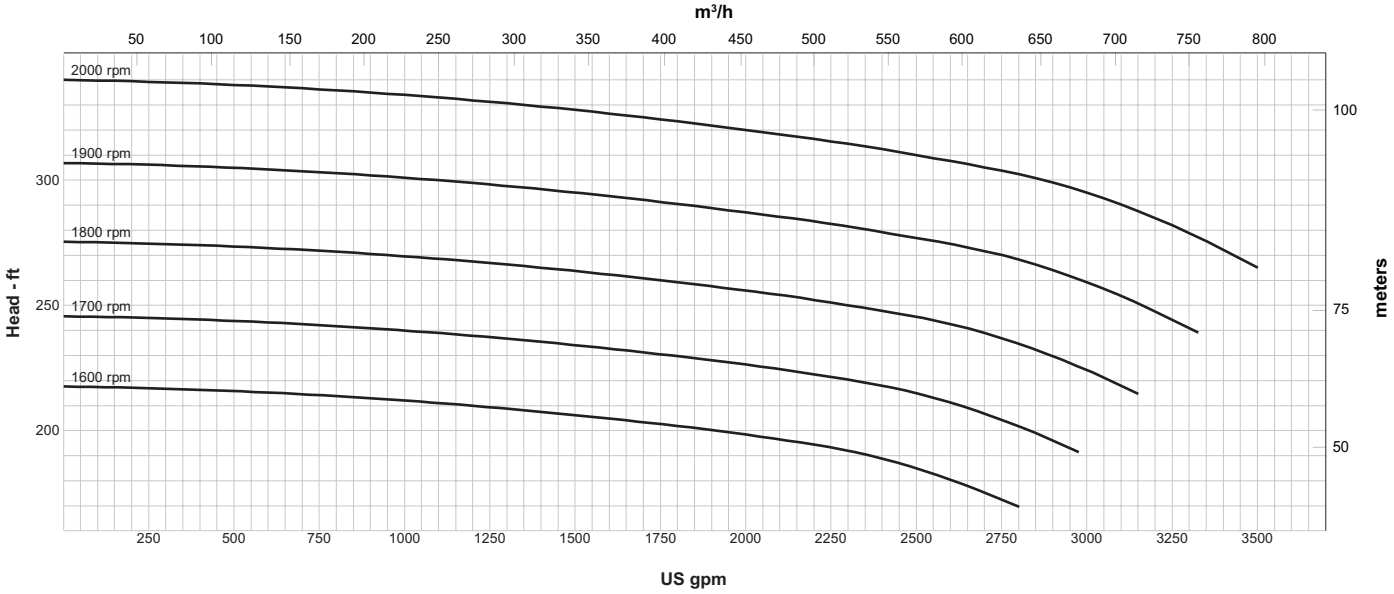
OPTIONS

- Technosub's Environmental Box captures venturi blow by, separates and silences air exhaust and returns liquid to the pump suction.
- Fuel tanks for extended run times and/or remote location as required
- Highway trailer with integral fuel cell/chassis, lights, fenders, tie downs, lifting bail, front and rear jacks
- Trailer brakes can be offered as required
- Sound attenuated enclosure options
- Hose racks, accessory containers and other custom features available as required
- Wide range of suction and discharge fittings including Technosub's own "QD" Quick Disconnect fittings and accessories

8TSHAP STANDARD HIGH HEAD AUTO PRIME







SPECIFICATIONS

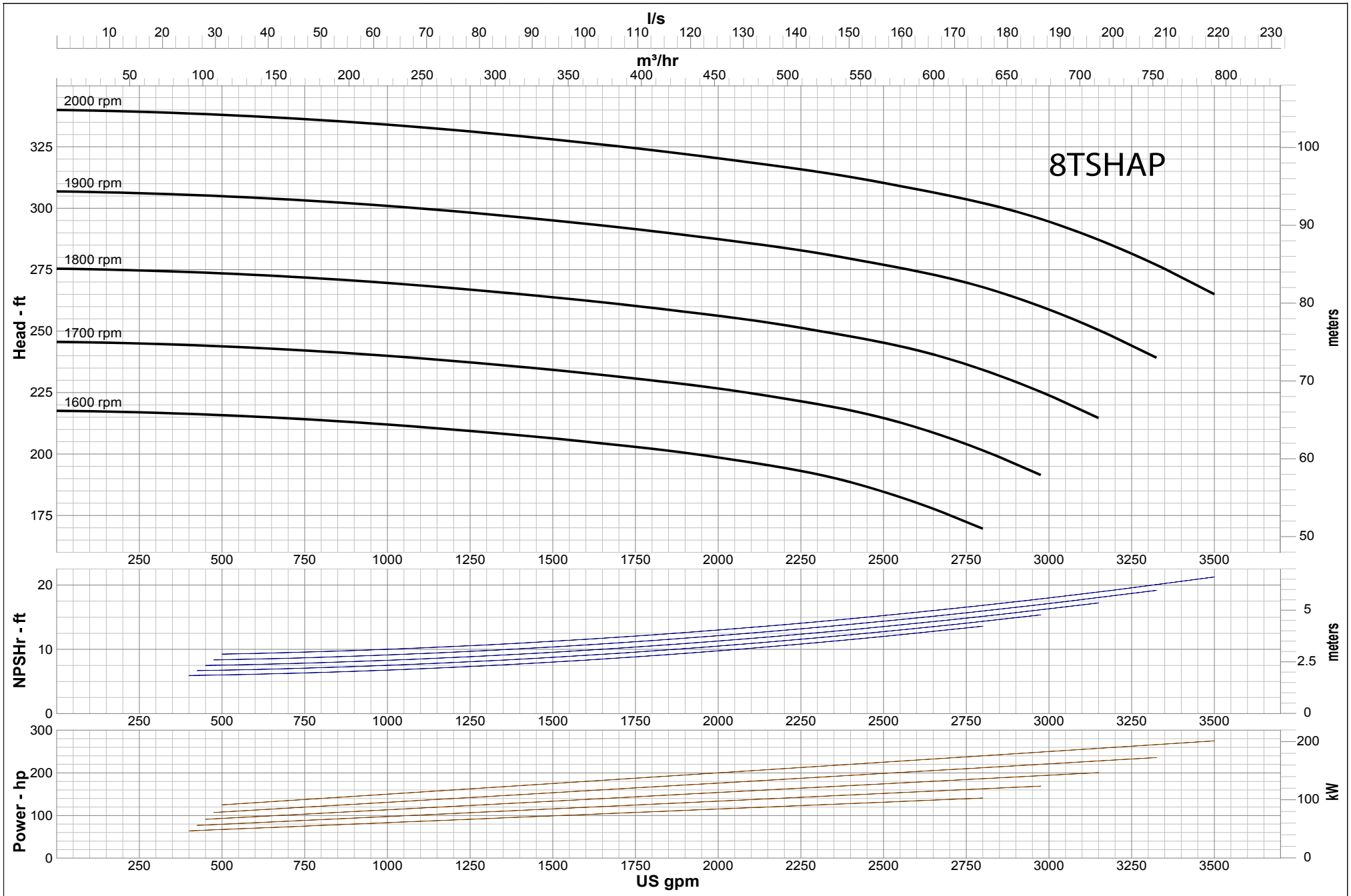
- **Connections:** 8”x 6” (200 mm x 150 mm) ANSI Flanges
- **Maximum Pump Speed:** 2000 rpm
- **Maximum Flow:** 3500 gpm (794 m^3/h)
- **Maximum Head:** 340’ (103 m)
- **Maximum Static Priming Lift:** 28’ (8.5 m)
- **Water Temperature Limit:** 160° F (70° C)
- **Solids Handling Capability:** 1-3/8” (35 mm)
- **Maximum Casing Pressure:** 200 psig (1379 kPa)
- **Standard Compact Fuel Tank:** 148 gallons (560 liters)
  Optional Large Fuel Tank: 215 gallons (814 liters)

PUMP MATERIALS

- **Casing:** Cast Iron (CD4MCu is an option)
- **Impeller:** CD4MCu
- **Bearing Housing:** Cast Iron
- **Bearing Lubrication:** Grease
- **Shaft:** Steel
- **Shaft Sleeve:** Stainless Steel
- **Seal:** Silicon Carbide on Silicon Carbide
- **Chassis/Fuel Cell:** Steel
- **Non-Return Valve:** Nitrile Fitted Cast Iron
- **Environmental Box (Optional):** Steel

1 866 797-3300 **TECHNOSUB.NET**
1156 Larivière avenue, Rouyn-Noranda QC Canada J9X 4K8
T 819 797-3300 **F** 819 797-3060 info@technosub.net

Technosub
INDUSTRIAL **PUMPS**
DEWATERING SOLUTIONS



SPECIFICATIONS

Technosub
Standard Trash Pump
Model: 8TSHAP

Speed: 1600 - 2000 rpm
Impeller Diameter: 16 in

- **Connections**: 8" x 6" (200 mm x 150 mm) ANSI Flanges
- **Maximum Pump Speed**: 2000 rpm
- **Maximum Flow**: 3500 gpm (794 m3/h)
- **Maximum Head**: 340' (103 m)
- **Maximum Static Priming Lift**: 28' (8.5 m)
- **Solids Handling Capability**: 1-3/8" (35 mm)

Technosub
INDUSTRIAL **PUMPS**
DEWATERING SOLUTIONS

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TSURUMI PUMP

KRS - SERIES
HIGH VOLUME - DEWATERING PUMPS

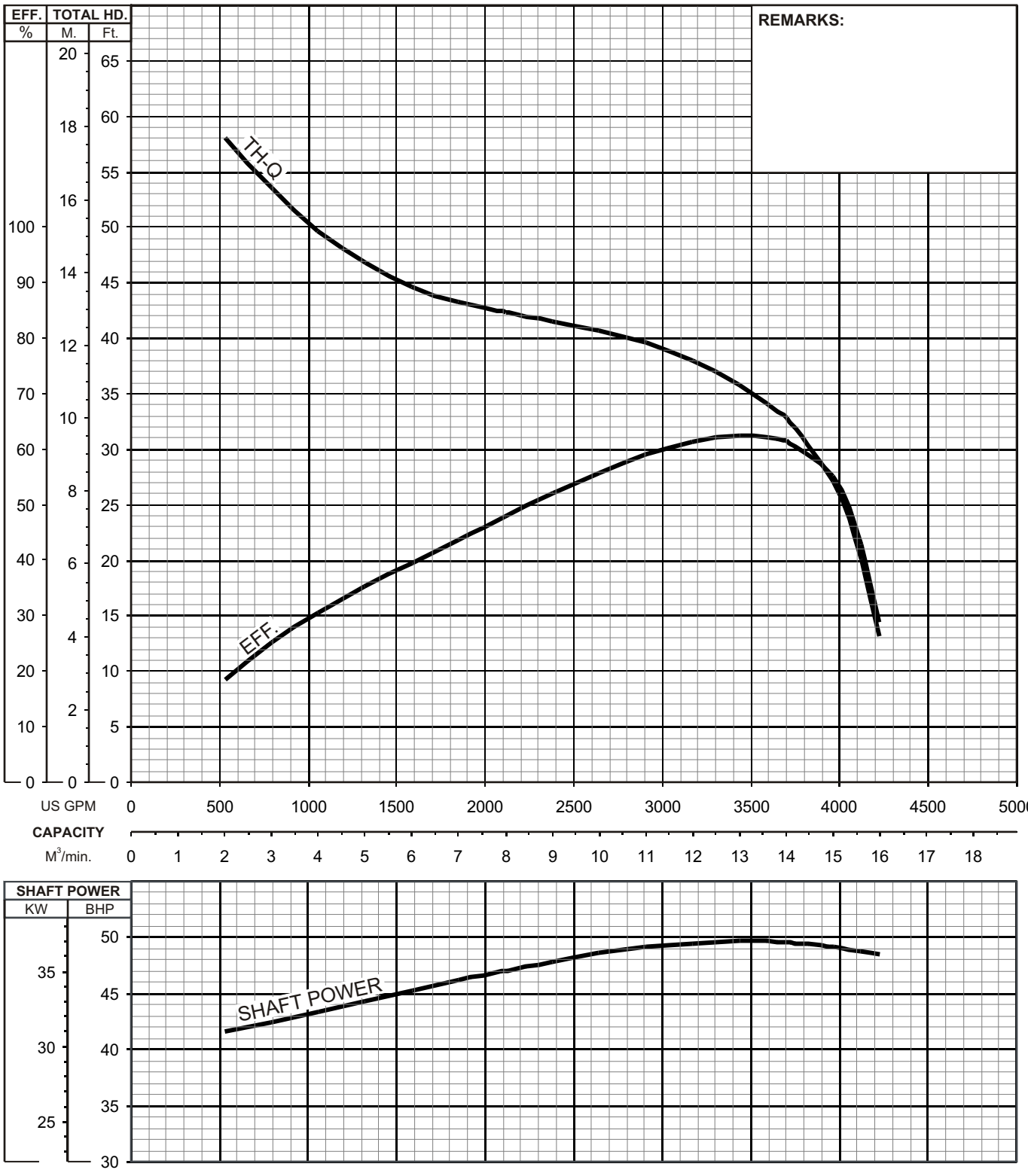
PERFORMANCE CURVE

MODEL	BORE	HP	KW	RPM	SOLIDS DIA	LIQUID	SG.	VISCOSITY	TEMP.
KRS-1437	14"/350mm	50	37	1165	1.97"/50mm	Water	1.0	1.123 cSt	60°F

PUMP TYPE	PHASE	VOLTAGE	AMPERAGE	HZ	STARTING METHOD	INS. CLASS
High Volume - Dewatering Pump	3	460 / 575	65 / 52	60	Star - Delta	F

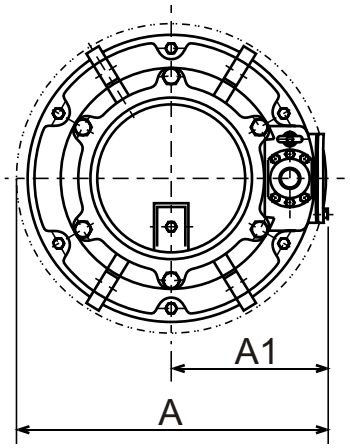
CURVE No.	DATE	PHASE	VOLTAGE	AMPERAGE	HZ	STARTING METHOD	INS. CLASS
-	-	-	-	-	-	-	-

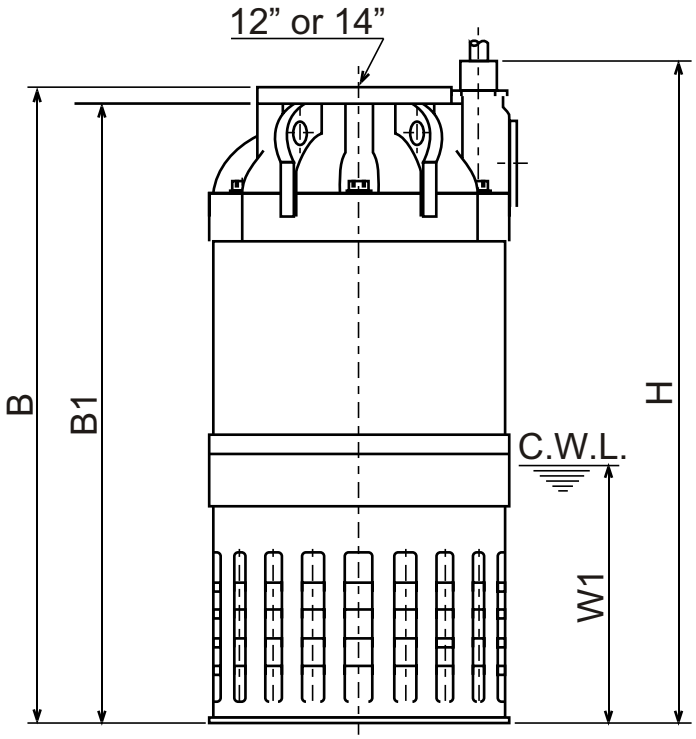
REMARKS:



TSURUMI PUMP | KRS - SERIES HIGH VOLUME - DEWATERING PUMPS | DIMENSIONS

KRS-1230
KRS-1437





C.W.L. : Continuous running Water Level

DIMENSIONS:USCS (Inch)

Model	HP	NOM. SIZE	Pump & Motor A	A1	B	B1	H	C.W.L. W1	Wt. (lbs.)
KRS-1230	40	12"	26 3/8	13 3/16	52 1/2	51 9/16	55 1/4	18 7/8	1540
KRS-1437	50	14"	26 3/8	13 3/16	52 1/2	51 9/16	55 1/4	18 7/8	1650

DIMENSIONS:METRIC (mm)

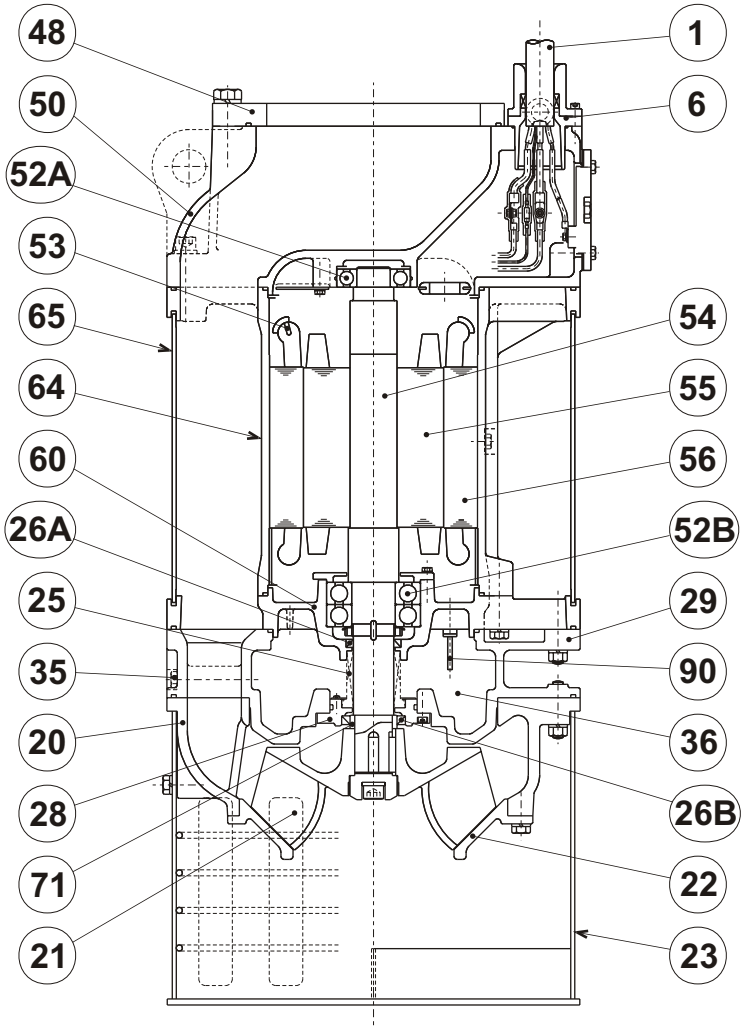
Model	kW	NOM. SIZE	Pump & Motor A	A1	B	B1	H	C.W.L. W1	Wt. (kg)
KRS-1230	30	300	670	335	1334	1310	1403	480	700
KRS-1437	37	350	670	335	1334	1310	1403	480	750

TSURUMI PUMP

KRS - SERIES
HIGH VOLUME - DEWATERING PUMPS

SECTIONAL VIEW

KRS-1437



ITEM#	DESCRIPTION	MAIN MATERIAL / NOTE	ASTM, AISI CODE	RELATED DIN CODE	Q'TY
1	Power Cable	Chloroprene Sheath AWG 2/6 , 4/1 , 14/3 -50ft			1
6	Stuffing Box	Cast Iron	A48 Class 35	1691/GG20	1
20A	Upper Pump Casing	Cast Iron	A48 Class 35	1691/GG20	1
20B	Lower Pump Casing	Cast Iron	A48 Class 35	1691/GG20	1
21	Impeller	High Chrome Cast Iron	A532 93d Class III Type A	1695;1977	1
22	Suction Cover	High Chrome Cast Iron	A532 93d Class III Type A	1695;1977	1
23	Suction Strainer	Steel	A283 Grade D	17100 RSt 46-2	1
25	Mechanical Seal	Silicon Carbide / H-60			1
26A	Oil Seal	Nitrile Butadiene Rubber / TC-608212			1
26B	Oil Seal	Nitrile Butadiene Rubber / TC-709513			1
28	Seal Housing	Cast Iron	A48 Class 40	1691/GG25	1
35	Oil Plug	Stainless Steel	AISI 403	17440 X15 Cr 13	2
36	Lubricant	Turbine Oil ISO VG32 or SAE10W/20W			
48	Companion Flange	Steel / 14"	A283 Grade D	17100 RSt 46-2	1
50	Motor Head Cover	Cast Iron	A48 Class 35	1691/GG20	1
52A	Upper Bearing	#6310ZZC3			1
52B	Lower Bearing	#6313ZZD2C3			1 set
53	Motor Protector				3
54	Shaft	Stainless Steel	AISI 420	17440 X20 Cr 13	1
55	Rotor				1
56	Stator				1
60	Bearing Housing	Cast Iron	A48 Class 35	1691/GG20	1
64	Motor Housing	Cast Iron	A48 Class 35	1691/GG20	1
65	Outer Cover	Steel	A283 Grade D	17100 RSt 46-2	1
71	Shaft Sleeve	Stainless Steel	AISI 304	17440 X5 CrNi 18-9	1
90	Leakage Sensor Electrode	Stainless Steel	AISI 420	17440 X20 Cr 13	1

FLOTATION MODULES PV-PMF

The Concept

Technosub's range of pump flotation modules has been developed to provide a light-weight and cost-effective alternative to the traditional steel pontoon.

General Applications

Pump Flotation Modules can be supplied to suit ALL Dewatering pumps.

Applications include:

- Mine dewatering
- Tailing dams
- Underground dams
- Sewage treatment
- Aeration ponds
- Floating foundation displays
- Construction site dewatering

Installation

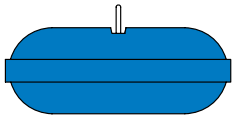
The pump and integral module can be simply installed by use of a central lifting attachment. Once in the water, the module can be towed by boat, if required, and secured in position by anchor or guy ropes. The float module remains visible above the water surface for easy recovery.

Design Features

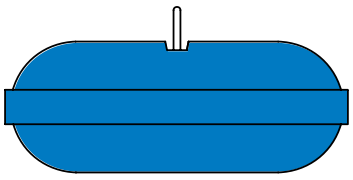
- Compact and lightweight
- Easily mounted to pumps on site
- Lifting points for easy installation
- Easy to transport as an integral unit
- Foam filled to prevent sinking

By having the pump floating close to the surface, it increases service life through reduced maintenance since it is no longer working in a high solids environment.

	PV-PFM 200	PV-PFM 1150
Float dimensions (mm - approximate)	1000 x 1000 x 450	1800 x 1800 x 760
Pump mounting bracket	Stainless steel	Galvanized steel
Weight (approximate) including brackets	68 kg to 78 kg	257 kg to 300 kg
Maximum Pump Weight	450 lbs / 205 kg	2500 lbs - 1100 kg

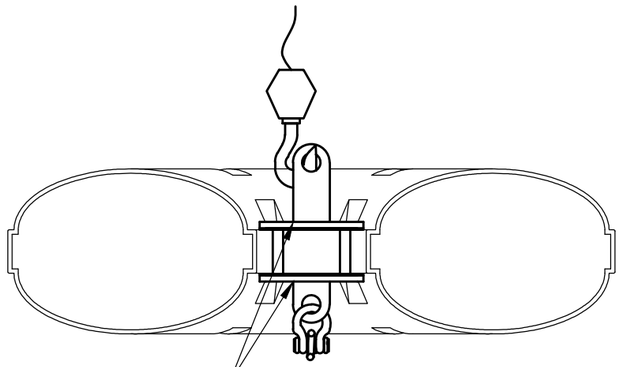


PV-PFM 200



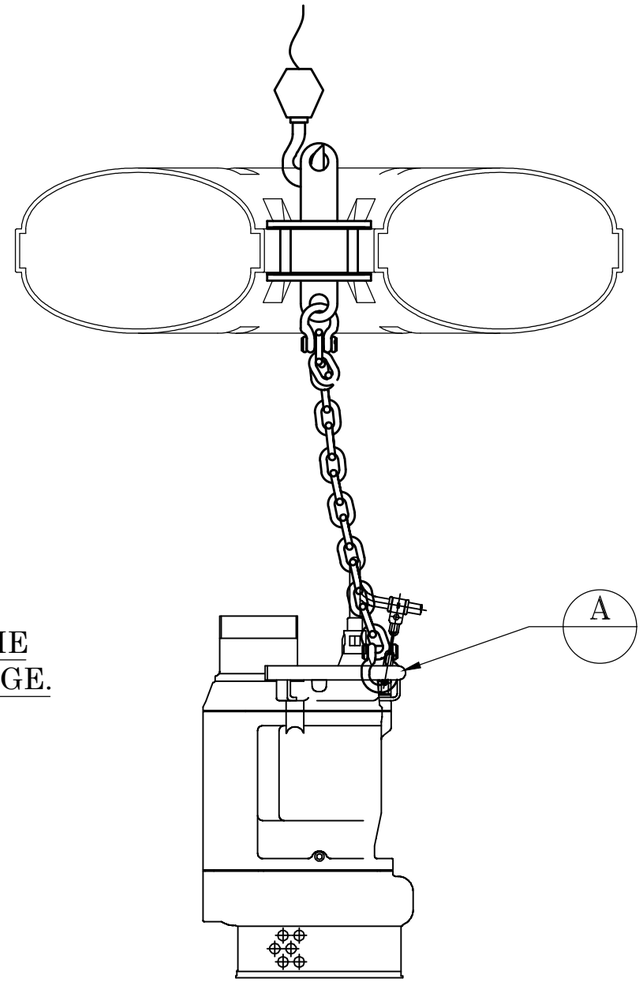
PV-PFM 1150

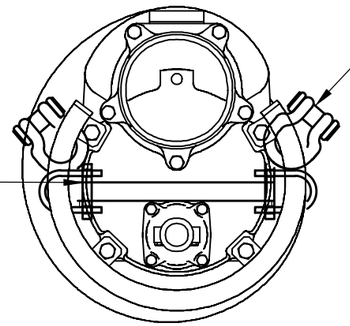
Technosub



INSTALL THE MOUNTING BRACKET SO THE LIFTING LUGS ARE PARALLEL

NOTE: USE THE SIDE CHAIN TO LIFT THE FLOAT AND ATTACH THE PUMP UNDER THE FLOAT. NEVER STAND BELLOW THE CHARGE.



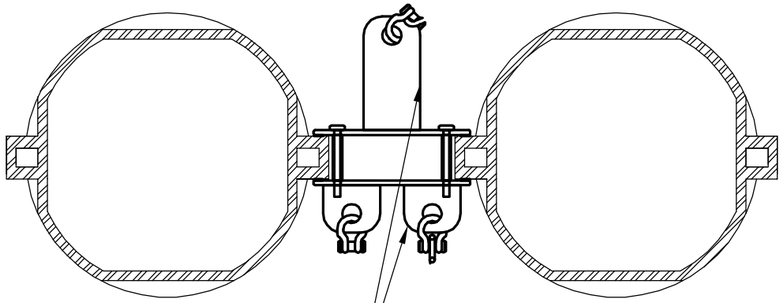


SHACKLE TO ATTACH THE CHAINS

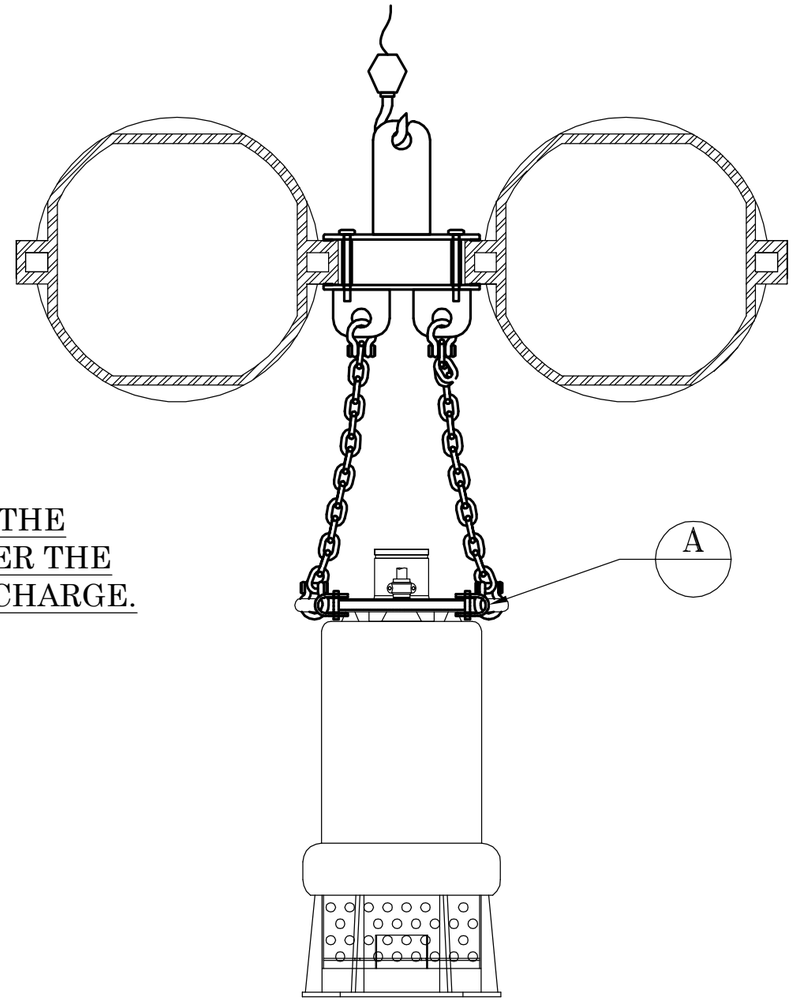
RETAINER GUARD

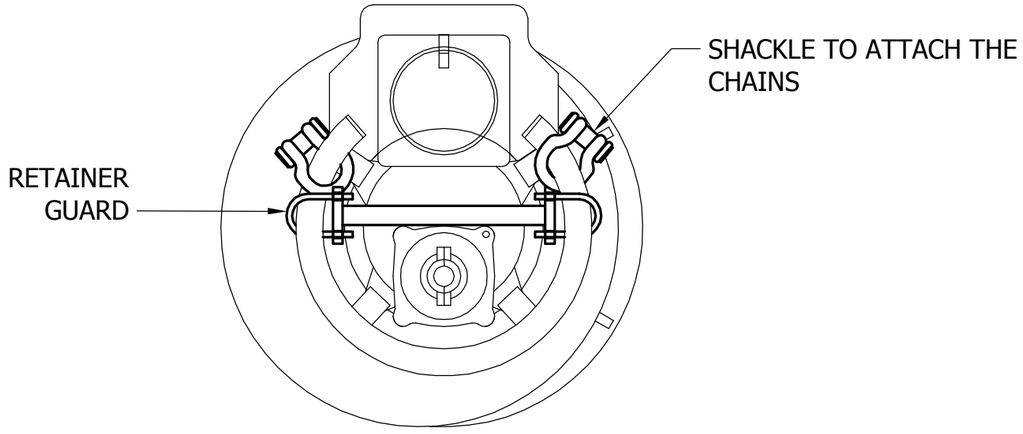
A DÉTAIL A
1-1/2" = 1'-0"

Techn sub	CLIENT: *Flotation Modules PV-PMF-200*
PROJECT NO:	Installation plan for mounting bracket - Floating Device
DRAWN: Y. DEMONTIGNY 2016-12-15	SIZE: B — DRAWING NO: — REV.: 0
CHECKED: R. MANTHA 2016-12-15	SCALE: 1-1/2" — WEIGHT: — SHEET: 1 DE 1
APPROUVÉ:	



NOTE: USE THE SIDE CHAIN TO LIFT THE FLOAT AND ATTACH THE PUMP UNDER THE FLOAT. NEVER STAND BELLOW THE CHARGE.





A DETAIL A
1-1/2" = 1'-0"

Techn@sub		CLIENT: *Flotation Modules PV-PMF-1150*	
PROJECT NO: Floating device		Installation plan for mounting bracket Floating device	
DRAWN: J. DESHAIES	2015-08-07	SIZE: B	DRAWING NO: TECH-000593
CHECKED: É. LAMONTAGNE	2015-08-07	SCALE: 1-1/2"	WEIGHT:
APPROVED: D. LALIBERTÉ	2015-08-07		SHEET: 1 OF 1
			REV. 0