



Submittal Review Response

Project Name: **Hilo WWTP Rehabilitation and Replacement Project Phase 1**
Submittal No.: **02256-002.0**
Date: **8/22/2025**

Client: County of Hawai'i Carollo Project No.: 203975
Contractor: Nan, Inc.
Submittal Name: Probe and Grout Work Plan
Reviewed By: Hipom Caleb Che

SUBMITTAL REVIEW

Review is for general compliance with contract documents. No responsibility is assumed by Carollo for correctness of quantities, dimensions, and details. No deviation or variation is approved unless specifically addressed in these review comments. Refer to Section 01330 for additional requirements. The Contractor shall assume full responsibility for coordination with all other trades and deviations from contract requirements.

Approved	<input type="checkbox"/> No Exceptions
	<input type="checkbox"/> Make Corrections Noted - See Comments
	<input checked="" type="checkbox"/> Make Corrections Noted - Confirm
Not Approved	<input type="checkbox"/> Correct and Resubmit
	<input type="checkbox"/> Rejected - See Remarks
Receipt Acknowledged	<input type="checkbox"/> Filed for Record
	<input type="checkbox"/> With Comments - Resubmit

Review Comments:

1. Proposed probe and grout mix design with Type 1L cement is acceptable.
2. Grout sample and testing shall be performed as required per Section 02256-3.02.B.2 and 02256-3.02.C. Test results shall be submitted under separate submittal.
1. There are several items missing in the submitted probe and grout log template sheet that are required in Section 02256-1.03.D Verify and include all the required information.
2. Verify and confirm submitted equipment meets requirements of Section 02256-2.02.

High Priority

CONTRACTOR SUBMITTAL TRANSMITTAL FORM REV. A

Owner: County of Hawaii
Contractor: Nan, Inc.
Project Name: Hilo WWTP Phase 1
Submittal Title:
TO:
From: Nan Inc.

Project No.: WW-4705R
Submittal Number:
For Information Only

Specification No. and Subject of Submittal / Equipment Supplier	
Spec:	Paragraph:
Authored By:	Date Submitted:

Submittal Certification		
Check Either (A) or (B):		
<input type="checkbox"/> (A)	We have verified that the equipment or material contained in this submittal meets all the requirements specified in the project manual or shown on the contract drawings with <u>no exceptions</u> .	
<input type="checkbox"/> (B)	We have verified that the equipment or material contained in this submittal meets all the requirements specified in the project manual or shown on the contract drawings <u>except</u> for the deviations listed.	
Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements.		
General Contractor's Reviewer's Signature:		
Printed Name and Title:		
In the event, Contractor believes the Submittal response does or will cause a change to the requirements of the Contract, Contractor shall immediately give written notice stating that Contractor considers the response to be a Change Order.		
Firm:	Signature:	Date Returned:

PM/CM Office Use	
Date Received GC to PM/CM:	
Date Received PM/CM to Reviewer:	
Date Received Reviewer to PM/CM:	
Date Sent PM/CM to GC:	

Nan, Inc

PROJECT: HILO WWTP REHABILITATION
AND REPLACEMENT PROJECT - PHASE 1

JOB NO. WW-4705R

THIS SUBMITTAL HAS BEEN CHECKED BY
THIS CONTRACTOR. IT IS CERTIFIED
CORRECT, COMPLETE, AND IN
COMPLIANCE WITH CONTRACT
DRAWINGS AND SPECIFICATIONS. ALL
AFFECTED CONTRACTORS AND
SUPPLIERS ARE AWARE OF, AND WILL
INTEGRATE THIS SUBMITTAL (UPON
APPROVAL) INTO THEIR OWN WORK.

DATE RECEIVED _____
SPECIFICATION SECTION # _____
SPECIFICATION _____
PARAGRAPH _____
DRAWING _____
SUBCONTRACTOR _____
SUPPLIER _____
MANUFACTURER _____

CERTIFIED BY CQCM or Designee : _____

Variance Request form

Hilo Wastewater Treatment Plant Phase 1
Contract No. WW-4705R

VARIANCE

Request Form

Variance Request

**Clearly and Concisely describe the nature of your request by completing the following questions below. By submitting the Variance Request form, Sub-Contractor acknowledges that they understand and accept the limitation of this form and agree that the information provided does not guarantee the approval of the Variance request. The decision to grant or deny a variance is at the sole discretion of the relevant authority or entity responsible for reviewing such requests.*

Specification section 02256 – Foundation Probing and Grouting

1. What are the benefits the variance has to the Government?

n/a

2. What are the positive and negative impacts to the project and Government if the variance is accepted?

No positive or negative impacts

3. Discuss how the variance is “equal to” or “better than” the specification requirement.

Variance along with the supporting documents are attached in the submittal package

4. What is the cost of the product/material that is originally specified?

n/a

Specification Section 02256

SECTION 02256

FOUNDATION PROBING AND GROUTING

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes the minimum requirements for drilling and grouting of foundation subgrade probe holes. The work includes mobilizing equipment for drilling and grouting; developing suitable drilling methods, grouting procedures, and grout mixing parameters; furnishing, handling, transporting, storing, mixing and injecting the grouting materials; handling and disposal of drill cuttings, waste water, and waste grout; cleanup of the areas upon completion of the work; and all labor, equipment, materials, and other incidentals to complete this work as specified herein. The work consists of drilling and grouting probe holes at specified locations, to depths specified in the Contract documents, or as directed by the Engineer, below foundations to detect and properly fill subsurface cavities or voids that may be encountered during probing with grout meeting requirements specified herein.
- B. The project's "Geotechnical Data Report, Hilo WWTP Rehabilitation & Replacement Project Phase I," prepared by Yogi Kwong Engineers, LLC, dated April 2024 presents data and information on subsurface conditions. These data represent the subsurface information available; however, variations may exist in the subsurface conditions between the exploratory boring and probe locations. Anticipate potential groundwater seepage and/or perched water flowing into the foundation probe holes.
- C. All work shall be performed in accordance with all City, State, and Federal safety and environmental regulations, permits, and other environmental control requirements specified in the Contract documents for the project.

1.02 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The commercial standards are referred to in the text by their basic designations only. The current requirements of the referenced standards and publications shall apply to this Section.
- B. Abbreviations:
 - 1. API - American Petroleum Institute.
 - 2. ASME - American Society of Mechanical Engineers.
 - 3. ASTM - American Society for Testing and Materials.
- C. Commercial Standards:
 - 1. API RP 13B-1 - Recommended Practice for Field Testing Water-based Drilling Fluids, 4th Edition.
 - 2. ASME B16.3 - Malleable Iron Threaded Fittings, Classes 150 and 300.
 - 3. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded at Seamless.

4. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 5. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 6. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens).
 7. ASTM C150/C150M - Standard Specification for Portland Cement.
 8. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
 9. ASTM C937 - Grout Fluidifier for Preplaced-Aggregate Concrete.
 10. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
- D. Standard Specifications:
1. Standard Specifications for Public Works Construction, City and County of Honolulu, 1986.



1.03 SUBMITTALS

- A. The following submittals listed below shall be submitted no later than sixty (60) calendar days after the Notice to Proceed and at least sixty (60) calendar days prior to mobilization of foundation excavation and related construction equipment, whichever comes first.
- B. Submit the name and qualifications of the Contractor-retained QC Specialist responsible to inspect, observe, and document the following work activities: drilling and cleaning of probe holes; grout preparation; backfilling; and any other related work activities as required throughout construction. Submit sufficient information in writing to demonstrate compliance with the project qualification requirements of Article 1.04 of this Section.
- C. Probe and Grout Work Plan:
 1. Submit a detailed work plan describing the proposed drilling and grouting methods and equipment to be used including at a minimum the following:
 - a. Drilling and grouting methods and procedures.
 - b. Description of drilling and grouting equipment, including manufacturer's literature describing capabilities.
 - c. Log template to be used by the QC Specialist to document grouting of probe holes.
 - d. Name and qualification of the independent testing agency.
 - e. Grout Mix Design(s).
 - f. Spoil control and disposal, including all necessary precautions to control and prevent discharge of grouting spoils and drill cuttings onto adjacent landscaped areas or properties.
 - g. Restoration plan.
- D. Reports and Records:
 1. The Contractor's retained QC Specialist shall keep records of drilling and grouting operations, to include at a minimum: Individual logs of each grouted holes, probe depths and probe penetration and withdrawal rate per each foot interval during drilling and grouting, geologic characteristics of drill cuttings

This requirement will be covered in a separate submittal.

Substitution of ASTM C595 Type IL in lieu of C150 Type I/II.

Supporting files are attached starting from pdf page 22.

return, the time of each change of grouting operation, the pressure and rate of pumping, grout mix(es) used onsite for each probe hole, grout returns, volume of grout pumped into each drilled hole, and other data as deemed by the QC Specialist to be necessary. Furnish all records to the Engineer in a report signed and stamped by the Contractor's retained QC specialist who shall certify the successful completion of the foundation drilling and grouting program.

1.04 QUALITY ASSURANCE

- A. QC Specialist shall be a Civil Engineer licensed in the State of Hawaii who has worked on a minimum of 3 successfully completed projects performing inspection of foundation probing and grouting work.
- B. Foundation drilling and grouting activities shall be performed will full-time on-site observation under the supervision of the QC Specialist. The QC Specialist is responsible for ensuring the probe holes be drilled and grouted based on accepted work plans and shop drawings, updating the work plan as construction progresses with additional probe holes as needed, and submitting an updated plan if necessary.
- C. Grout Testing shall be performed by an independent testing agency or laboratory that can certify compliance with requirement of ASTM E329, or as accepted by the Engineer. The laboratory shall demonstrate experience performing the laboratory tests of grout mix(es) required herein.

PART 2 PRODUCTS

2.01 MATERIALS AND MIX DESIGN

- A. Deliver all necessary ingredients for grouting in undamaged, unopened containers bearing manufacturer's original label. Store and handle grout materials in accordance with manufacturer's recommendations and in accordance with Section 03300 - Cast-in-Place Concrete and Section 03600 - Grouting.
- B. Grouting Materials: Provide grout composed of a mixture of Portland cement, water, and sand thoroughly mixed together with fluidifier and/or admixture(s), if necessary, into a uniform and balanced mixture. The grout mix(es) shall have a consistency that is fluid and pumpable. Grouting materials shall be as specified in Section 03300 - Cast-in-Place Concrete, Section 03600 - Grouting, and as specified hereinafter. Provide non-shrink, non-metallic, non-gaseous cement grout with a minimum compressive strength of 1,000 psi at 28 calendar days.
- C. Cement: Portland cement, ASTM C150, Type I or II.
- D. Fluidifier: Fluidifier shall be a compound capable of increasing the flowability of the mixture, by assisting in dispersal of the cement grains and neutralizing the setting shrinkage of the grout. The property and performance of the fluidifier shall meet the requirements specified in ASTM C937.

- E. Admixtures: Admixtures shall meet the requirements specified in ASTM C494. If 2 or more admixtures and/or fluidifier are used, all shall be compatible into a uniform and balanced mixture.
- F. Water: Potable water shall be used.

2.02 EQUIPMENT

- A. Drilling Equipment:
 - 1. Standard drilling equipment of the rotary or percussion type capable of completing the work shall be used to perform the drilling. Use air and/or water for removing cuttings from the probe holes during drilling operations. Supplies shall include all bits, drill rods, tools, casing, piping, pumps, water, and power to accomplish the required drilling. All drilling rigs and pumps shall be equipped with pressure gauges.
- B. Grouting Equipment:
 - 1. The grouting equipment shall be capable of accepting, mixing, and stirring the grout ingredients and additives into a uniform and balanced grout mixture, and shall also be capable of pumping the grout mixture into the probe holes to the specified depths and to the satisfaction of the Engineer.
 - a. Pipes and Fittings: pipes and fittings required for placing grout and providing drainage shall be furnished, cut, threaded, and fabricated by the Contractor.
 - 1) Pipes: Pipes shall be made of black steel with the specified minimum diameters and used in the locations as indicated on the drawings. The pipes shall conform to ASTM A53/A53M.
 - 2) Fittings: Fittings shall be made of black, malleable iron in conformance with ASME B16.3.
- C. Recording Equipment:
 - 1. Provide automatic recording equipment with a meter to measure the volume of grout injected into each probe hole. The meter shall be calibrated in cubic feet to the nearest one-tenth of a cubic foot.
- D. Spare parts and/or tools/equipment shall be available on-site to maintain drilling and grouting equipment in satisfactory operating conditions at all times during execution of the drilling and grouting work. Any probe hole lost or damaged as a result of mechanical failure of equipment; inadequate grout supplies; or improper drilling or grouting procedures shall be replaced and re-grouted with another hole, as approved by the Engineer, at no additional cost to the Owner.

PART 3 EXECUTION

3.01 GENERAL DRILLING AND GROUTING PROCEDURE

- A. Notify the Engineer at least 15 days before beginning foundation probe drilling and grouting.

B. Drilling:

1. At a minimum, drill probe holes where indicated on the contract drawings, plus any additional probe holes as directed by the Engineer. However, base the bid price on the number of probe holes and quantities indicated in the Schedule of Values provided in the Bid Documents. The number of probe holes and quantities indicated in the Schedule of Values were developed from the Foundation Probe Hole Schedule and Foundation Probe Hole Schedule for Additive Alternate No. 1 provided herein. In case of a conflict between the Schedule of Values and the schedules provided herein, base the bid price on the numbers and quantities provided in the Schedule of Values. Probe holes shall be minimum 3 inches in diameter and drilled to the depths below the foundation subgrade elevations specified in the probe hole schedule provided herein and on the contract drawings. Do not drill deeper than the specified "drilled depth below foundation" unless directed by the Engineer.
2. If cavities, voids, and/or very soft or loose zones are detected below where slabs on grade or foundations are to be constructed, additional probe holes shall be drilled to delineate their lateral extents as directed by the Engineer or the onsite designated representative of the Engineer.

Deleted as per Bid Addendum 04		Foundation Probe Hole Schedule		
Building/Facility/ Location	Drilled Depth Below Foundation (ft) ⁽¹⁾	Number of Probe Holes to Drill ⁽²⁾	Estimated Injected Grout Quantity (10x Theoretical Volume of a Drilled Probe Hole) (CY) ⁽³⁾	
			Estimated Injected Grout Quantity (10x Theoretical Volume of a Drilled Probe Hole) (CY) ⁽³⁾	
Septage Receiving Station	20	24	9	
Septage Receiving Station - Concrete Ballast	20	10	4	
Headworks	40	78	57	
Headworks - Grit Pump Room	40	41	30	
Headworks - Loading Bay	20	10	4	
Headworks Electrical Building	20	18	7	
Sludge Blending	30	29	16	
Propane Tank	20	3	2	
Headworks Odor Control Facility	30	42	23	
Flare	20	12	5	
Digester Gas Conditioning System	20	21	8	
Digester 1	45	49	41	
Digester 2	45	49	41	
Digester Control Building 1	35	61	39	
Primary Sedimentation Tanks - Stairs	20	6	3	

Deleted as per Bid Addendum 04

Deleted as per Bid Addendum 04

Foundation Probe Hole Schedule

Replacement for this table has been provided as a part of Bid Addendum 04 and is pasted after this sheet

**Building/Facility/
Location**

**Drilled Depth
Below
Foundation
(ft)⁽¹⁾**

**Number of
Probe
Holes to
Drill⁽²⁾**

**Estimated Injected
Grout Quantity
(10x Theoretical
Volume of a
Drilled Probe
Hole) (CY)⁽³⁾**

Primary Sedimentation Tanks - Concrete Slab

20

12

5

Solids Handling & SCADA Buildings

40

180

131

Solids Odor Control

30

24

14

Return Flow Pump Station

20

9

4

Primary Facilities - Electrical Equipment Pads

20

14

6

Stand By Generator

20

12

5

Additional Probe Holes included in the Base Bid

40

300

219

Total Sum of the Estimated Grout Quantities

673

Notes:

(1) Depth (in feet) below the footing foundation subgrade elevation.

(2) Refer to Plans for drilled probe hole locations.

(3) Based on 3-inch diameter drilled probe holes. Refer to Article 3.01 Paragraph C.1.d for drilled probe hole diameters larger than 3 inches selected by the Contractor.

Deleted as per Bid Addendum 04

Foundation Probe Hole Schedule for Additive Alternate NO. 1**Building/Facility/
Location**

**Drilled Depth
Below
Foundation (ft)⁽¹⁾**

**Number of Probe
Holes to Drill⁽²⁾**

**Estimated Injected
Grout Quantity (10x
Theoretical Volume
of a Drilled Probe
Hole) (CY)⁽³⁾**

Digester 3

45

49

41

Digester Control Building 2

35

54

35

Additional Probe Holes included in Additive Alternate No. 1

40

50

37

Total Sum of the Estimated Grout Quantities

113

Notes:

(1) Depth (in feet) below the footing foundation subgrade elevation.

(2) Refer to Plans for drilled probe hole locations.

(3) Based on 3-inch diameter drilled probe holes. Refer to Article 3.01 Paragraph C.1.a.5) for drilled probe hole diameters larger than 3 inches selected by the Contractor.

Deleted as per Bid Addendum 08

Replacement for this table has been provided as a part of Bid Addendum 08 and is pasted after the next sheet

5. AMENDED Section 02256 – FOUNDATION PROBING AND GROUTING:

- A. REPLACE the table that follows paragraph 3.01.B.2 titled "Foundation Probe Hole Schedule" in its entirety with the following table:

Foundation Probe Hole Schedule			
Building/Facility/ Location	Drilled Depth Below Foundation (ft)⁽¹⁾	Number of Probe Holes to Drill⁽²⁾	Estimated Injected Grout Quantity (10x Theoretical Volume of a Drilled Probe Hole) (CY)⁽³⁾
Septage Receiving Station	20	24	9
Septage Receiving Station - Concrete Ballast	20	10	4
Headworks	40	78	57
Headworks - Grit Pump Room	40	41	30
Headworks - Loading Bay	20	10	4
Headworks Electrical Building	20	18	7
Sludge Blending	30	29	16
Propane Tank	20	3	2
Headworks Odor Control Facility	30	42	23
Flare	20	12	5
Digester Gas Conditioning System	20	21	8
Digester 1	45	49	41
Digester 2	45	49	41
Digester Control Building 1	35	61	39
Primary Sedimentation Tanks - Stairs	20	6	3
Primary Sedimentation Tanks - Concrete Slab	20	12	5
Solids Handling & SCADA Buildings	40	180	131
Solids Odor Control	30	24	14
Return Flow Pump Station	20	9	4
Primary Facilities - Electrical Equipment Pads	20	14	6
Stand By Generator	20	12	5
3W Pump Station	20	4	2
North Drainage Pump Station	30	7	4

New Table for foundation probe hole schedule has been added as part of bid addendum 04.

Foundation Probe Hole Schedule			
Building/Facility/ Location	Drilled Depth Below Foundation (ft) ⁽¹⁾	Number of Probe Holes to Drill ⁽²⁾	Estimated Injected Grout Quantity (10x Theoretical Volume of a Drilled Probe Hole) (CY) ⁽³⁾
Additional Probe Holes included in the Base Bid	40	300	219
Total Sum of the Estimated Grout Quantities			679

Notes:

(1) Depth (in feet) below the footing foundation subgrade elevation.
(2) Refer to Plans for drilled probe hole locations.
(3) Based on 3-inch diameter drilled probe holes. Refer to Article 3.01 Paragraph C.1.d for drilled probe hole diameters larger than 3 inches selected by the Contractor.

Deleted as per Bid Addendum 08

Replacement for this table has been provided as a part of Bid
Addendum 08 and is pasted after the next sheet

New Table for foundation probe hole schedule has been added as part of bid addendum 08.

11. **AMENDED** Section 02256 – FOUNDATION PROBING AND GROUTING:

- A. **REPLACE** the table that follows paragraph 3.01.B.2 titled "Foundation Probe Hole Schedule" in its entirety with the following table:

Foundation Probe Hole Schedule			
Building/Facility/ Location	Drilled Depth Below Foundation (ft)⁽¹⁾	Number of Probe Holes to Drill⁽²⁾	Estimated Injected Grout Quantity (10x Theoretical Volume of a Drilled Probe Hole) (CY)⁽³⁾
Septage Receiving Station	20	24	9
Septage Receiving Station - Concrete Ballast	20	10	4
Headworks	40	78	57
Headworks - Grit Pump Room	40	41	30
Headworks - Loading Bay	20	10	4
Headworks Electrical Building	20	18	7
Sludge Blending	30	29	16
Propane Tank	20	3	2
Headworks Odor Control Facility	30	42	23
Flare	20	12	5

**New Table for foundation probe hole schedule
has been added as part of bid addendum 08.**

Foundation Probe Hole Schedule			
Building/Facility/ Location	Drilled Depth Below Foundation (ft)⁽¹⁾	Number of Probe Holes to Drill⁽²⁾	Estimated Injected Grout Quantity (10x Theoretical Volume of a Drilled Probe Hole) (CY)⁽³⁾
Digester Gas Conditioning System	20	21	8
Digester 1	45	49	41
Digester 2	45	49	41
Digester Control Building 1	35	61	39
Primary Sedimentation Tanks - Stairs	20	6	3
Primary Sedimentation Tanks - Concrete Slab	20	12	5
Solids Handling & SCADA Buildings	40	180	131
Solids Odor Control	30	24	14
Return Flow Pump Station	20	9	4
Primary Facilities - Electrical Equipment Pads	20	14	6
Stand By Generator	20	12	5
3W Pump Station	20	4	2
North Drainage Pump Station	30	7	4
Dumpster Concrete Loading Pad	30	20	11
Warehouse Building	20	64	23
Additional Probe Holes included in the Base Bid	40	350	255
Total Sum of the Estimated Grout Quantities			749

Notes:

- (1) Depth (in feet) below the footing foundation subgrade elevation.
- (2) Refer to Plans for drilled probe hole locations.
- (3) Based on 3-inch diameter drilled probe holes. Refer to Article 3.01 Paragraph C.1.d for drilled probe hole diameters larger than 3 inches selected by the Contractor.

C. Grouting:

1. All grouting operations shall be performed under the supervision of the Contractor's retained QC Specialist and in the presence of the Engineer or an onsite designated representative of the Engineer. The Contractor shall notify the Engineer at least 1 week prior to starting or resuming probing and grouting at each site.
 - a. Grouting Injection:
 - 1) Grout each probe hole through a minimum 1.5-inch or suitable larger diameter pipe inserted to the bottom of the probe hole.
 - 2) At a minimum, the volume of grout to be pumped successively into each probe hole shall be equal to at least the theoretical volume of the probe hole.
 - 3) The grouting of any probe hole shall not be considered complete until that hole refuses to take any more grout with grout overflowing top of the hole.
 - 4) Grout used during the drilling procedure for lubrication shall not be counted toward the volume of grout injected into the probe hole. Grout used to fill the probe hole shall be monitored after reaching the specified depth below foundation.
 - 5) Grout quantities that are injected due to the difference in size between a 3-inch diameter probe hole and a larger diameter probe hole drilled by the Contractor will not be considered as part of the measured grout for payment.
 - 6) If it is found impracticable to complete grouting after pumping up to 1 cubic yard, pumping shall be stopped temporarily and, as directed by the Engineer or the onsite designated representative of the Engineer, intermittent grouting shall be performed into the hole, allowing sufficient time between grout injections for the grout to stiffen. If the desired result is not obtained, grouting shall be discontinued at the probe hole when directed. In such an event, the hole shall be cleaned, the grout allowed to set, and additional probing of minimum 3-inch diameter probe hole and grouting shall then be performed in the partially grouted holes or in the adjacent areas as directed, until the desired grout intake at each hole is achieved, to the satisfaction of the Engineer.
 - 7) Grout that cannot be placed, for any reason, into a probe hole within 2 hours after mixing, or a shorter time as specified by the grout manufacturer, shall be properly disposed of and is not considered as part of the measured grout for payment.
 - b. Equipment Capability and Operation:
 - 1) The grouting equipment and system shall be capable of providing a continuous circulation of grout throughout the system and permitting accurate pressure control by operation of a valve on the grout return line, regardless of how small the grout intake may be. The equipment and lines shall be prevented from becoming fouled by constant circulation of grout and periodic flushing out of the system with water. Flushing shall be done with the grout intake valve closed, the water supply valve opened, and the pump running at full speed.
 - c. When authorized by the Engineer, the Contractor shall backfill encountered cavities and/or voids as directed by the Engineer or the onsite designated representative of the Engineer. The Contractor shall

perform the work in accordance with accepted submittals. The Contractor shall provide all necessary labor, equipment, and materials to fill the encountered cavities and/or voids. Excavations or boreholes shall be supported with suitable shoring provisions to avoid loss of ground and ground movements that could damage adjacent utilities, structures, or improvements, in accordance with Section 02300 - Earthwork. Backfill materials to fill cavities and/or voids, when authorized by the Engineer, shall consist of self-compacting sands and/or gravels, controlled low strength material (CLSM), and/or concrete. Any damage caused by excavation and backfill to fill cavities and/or voids shall be immediately repaired at no additional cost to the Owner.

D. Protection of Work and Cleanup:

1. The Contractor shall furnish pumps and other equipment necessary to handle and properly dispose of drill spoils, and waste grout from all drilling, grouting, and related operations. Upon completion of these operations, clean up all wastes resulting from the operations that are unsightly or would interfere with foundation or other construction. Discharge of all wastes shall be performed in accordance with all applicable government requirements.
2. Roadways shall be cleaned by the Contractor as required to prevent excessive dusting or dirt accumulation, at a minimum, on a daily basis. Vehicles shall be washed prior to exiting the project site and the disposal or stockpiling sites and entering public roadways, as required. The Contractor is responsible to immediately contain and remove all washing or cleaning water from the sites, and discharge or dispose of them properly in accordance with all applicable government requirements.

E. Communications:

1. When, for its own convenience, the Contractor has the individual elements of the plant so located that communication by normal voice between these elements is not satisfactory, the Engineer may require the Contractor to provide a satisfactory means of communications, such as a mobile telephone or other suitable device, at no additional cost to the Owner.

3.02 QUALITY CONTROL

- A. All quality control (QC) testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Owner.
- B. Grout Mix:
 1. During the execution of the foundation probing and grouting, the unit weight or specific gravity shall be measured on liquid samples of grout taken from the grout return line, to verify grout mix uniformity.
 2. Testing shall be performed in accordance with API RP 13B-1 test method. Testing frequency shall be at least 1 test for every two (2) hours that grout is mixed and pumped. Complete and accurate records shall be kept to verify that grout mix is as accepted.

C. Grout Samples:

1. For every 10 probe holes, 2 sets of 4 samples (8 samples total) of the cement grout used for grouting the probe holes shall be collected and fabricated in accordance with ASTM C31/C31M or C109/C109M.
2. Each of these samples shall be stored in a damp environment at constant temperature in accordance with applicable ASTM procedures.
3. After the samples have cured sufficiently, they shall be taken to an independent qualified laboratory, accepted by the Engineer, for testing.
4. Two grout samples shall be subjected to compressive strength tests at 7 days in accordance with ASTM C39/C39M or C109/C109M. The remaining samples shall be subjected to compressive strength test at 28 days following the same ASTM testing procedures.

3.03 MEASUREMENT AND PAYMENT

- A. The project Contract Price shall be adjusted based on the variance in total length of drilled probe holes (i.e. actual total length of drilled probe holes minus the total length of drilled probe holes listed in the Schedule of Values) and the Contractor's unit price listed for this item at bid time in the Schedule of Values.
 1. Adjustment in the Contract Price shall be in accordance with the 1972 General Requirements and Covenants (GRC), Section 4.2-Changes, Article (a)- Increased or Decreased Quantities, Item 1-Unit Price Work and the Special Provisions.
- B. The project Contract Price shall be adjusted based on the variance in grout volume (i.e. actual permissible measured grout volume injected in the probe holes minus the total grout volume listed in the Schedule of Values) and the Contractor's unit price listed for this item at bid time in the Schedule of Values.
 1. Adjustment in the Contract Price shall be in accordance with the 1972 General Requirements and Covenants (GRC), Section 4.2-Changes, Article (a)- Increased or Decreased Quantities, Item 1-Unit Price Work and the Special Provisions.
- C. Payment for additional excavation and backfill to fill cavities and/or voids, directed by the Engineer or the onsite designated representative of the Engineer as specified in Article 3.01 Paragraph C.1.c, including all standby and direct costs related to drilling, excavations, fill, compaction, labor, materials, equipment, and all other incidentals, shall be paid from the allowance for other cavity and/or void backfill as described in Section 01210 - Allowances.

END OF SECTION

Grout Mix Design

ISEMOTO CONTRACTING CO., LTD.
74-5039B Queen Kaahumanu Hwy.
Kailua-Kona, HI 96740

LETTER OF TRANSMITTAL

TO: Nan, Inc.
161 Silva Street
Hilo, HI 96720
Attention: Mr. Brandon Farrell

Date: 6/20/2025 **ICC Job No:** 50615
Job Name: Hilo WWTP Rehabilitation &
Replacement Project Phase 1

WE ARE SENDING YOU **ATTACHED** **UNDER SEPARATE COVER VIA** _____

<input type="checkbox"/> CONTRACT	<input type="checkbox"/> PAYMENT REQUEST
<input type="checkbox"/> CHANGE ORDER	<input type="checkbox"/> CERTIFIED PAYROLL
<input type="checkbox"/> QUOTATION	<input type="checkbox"/> PROPOSAL
<input type="checkbox"/> PURCHASE ORDER	<input type="checkbox"/> COPY OF LETTER
<input type="checkbox"/> WORK ORDER	<input type="checkbox"/> PHOTOGRAPHS
<input type="checkbox"/> OTHER _____	

<input checked="" type="checkbox"/> SUBMITTALS
<input type="checkbox"/> SHOP DRAWINGS
<input type="checkbox"/> SAMPLES
<input type="checkbox"/> PLANS
<input type="checkbox"/> SPECIFICATIONS

QUANTITY	DATE	NO.	DESCRIPTION
1		1	2000 Psi Grout (Jas. W. Glover, Ltd.)

THESE ARE TRANSMITTED AS CHECKED BELOW

<input checked="" type="checkbox"/> FOR APPROVAL
<input type="checkbox"/> FOR YOUR USE
<input type="checkbox"/> AS REQUESTED
<input type="checkbox"/> FOR REVIEW AND COMMENT
<input type="checkbox"/> FOR BIDS DUE ON _____

<input type="checkbox"/> APPROVED AS SUBMITTED
<input type="checkbox"/> APPROVED AS NOTED
<input type="checkbox"/> RETURNED FOR CORRECTIONS
<input type="checkbox"/> RESUBMIT _____ COPIES FOR APPROVAL
<input type="checkbox"/> RETURNING _____ SETS OF PRINTS

<input type="checkbox"/> FOR YOUR INFORMATION
<input type="checkbox"/> REQUEST FOR _____
<input type="checkbox"/> SUBMIT _____ COPIES FOR DISTRIBUTION
<input type="checkbox"/> RETURN _____ CORRECTED PRINTS
<input type="checkbox"/> OTHER _____

REMARKS:

COPIES TO: Mr. Nishant More

SIGNED: Scot S. Yoshimura

Scot S. Yoshimura
Project Manager

Phone: (808) 329-8051

Fax: (808) 329-3261



JAS. W. GLOVER, LTD
HILO, HAWAII
TESTING LABORATORY

MIX DESIGN FOR PORTLAND CEMENT CONCRETE

DATE: 6/20/25

TO: Isemoto Contracting

FROM: JAS W. GLOVER, LTD.

PROJECT: Hilo WWTP Rehabilitation and Replacement Project Phase 1

PROJECT NO.: [REDACTED]

CLASS: Fine Grout 2000 psi

Concrete will be supplied by:
Jas. W. Glover, LTD.

MIX NUMBER: HFG20A

DESIGN WEIGHTS PER CUBIC YARD

MATERIAL	CEMENT	SCM/DRY	FINE AGG			COARSE AGG			WATER		
			TYPE 1L	NONE	#4 SAND	FINE SAND	3C(#57)	3F(#67)	#8 CHIP	H ₂ O	AIR%
SOURCE:	HAWAIIAN	FIBERS	GLOVER	GLOVER	GLOVER	GLOVER	GLOVER	GLOVER	COUNTY	AIR%	ADMIX
SSD WTS LBS.	470	0.0	0	3044	0	0	0	0	392		1.5
SPEC. GRAVITY	3.14	0.000	2.817	2.810	2.800	2.810	2.839	2.839	1		
ABSOLUTE VOL.	2.4	0.00	0.00	17.36	0.00	0.00	0.00	0.00	6.27	0.95	0.02
% MOISTURE			3.40	3.20	2.40	1.90	1.80	1.80			
% ABSORPTION			3.40	3.20	2.40	1.90	1.80	1.80			
CORRECTION %			0.00	0.00	0.00	0.00	0.00	0.00			
CORRECTION LB.			0	0	0	0	0	0	0		
BATCH WTS LB.	470	0	0	3044	0	0	0	0	392	0	2
											3907

Slump (in.):

8"- 10"

Air (%):

3.5%

Unit Wt.(lbs./ft³):

144.70

W/C Ratio (lb/lb):

0.83

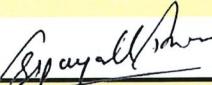
H₂O (Gal.):

47.0

ADMIXTURE TYPE	RETARDER	MID-RANGE	HRWR	STABILIZER	VMA	AIR	SRA	CORROSION INHIBITOR	OTHER
ADMIXTURE NAME	DELVO	POZ 322	GLENIUM	Z-60	VMAR-3	DAREX	SRA-35	MCI2005	DCI-S
LOW OZ/CWT:	1.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADMIX OZ / YD3:	4.7	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HIGH OZ/CWT:	1.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADMIX OZ / YD3:	4.7	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPEC. GRAV.	1.08	1.21	1.05	1.04	1.02	1.04	#N/A	0.99	1.20
ABS. VOL.:	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00

REMARKS: 1) PLEASE REFER TO MIX NUMBER WHEN ORDERING THIS MIX.

SUBMITTED BY:


Jayanth Kumar Rayapetti Kumar, PE

Quality Control Engineer

By:

Prime Contractor

MIX DESIGN SUBJECT TO MODIFICATION TO MAINTAIN YIELD, STRENGTH, WORKABILITY, AND/ OR SETTING TIME.

Aggregate Qualification

Item	Test Method	#57	#67	#8	#4 Fine	Fine Sand
1	Sieve Analysis, C136, C117					
	2-1/2"					
	2"					
	1-1/2"	100	100	100	100	100
	1"	100	100	100	100	100
	3/4"	89	100	100	100	100
	1/2"	41	63	100	100	100
	3/8"	16	31	98	100	100
	#4	7	8	22	100	100
	#8	3	4	7	74	81
	#16	2	2	2	49	59
	#30	1	1	1	33	39
	#50	1	1	1	23	27
	#100	1	1	1	19	20
	#200	0.1	0.5	0.7	12.5	15.0
2	Fineness Modulus				3.0	2.7
	Sand Equivalent, T176, C2419				85	79
	Specific Gravity C127, C128					
	3a SSD Specific Gravity	2.800	2.810	2.839	2.817	2.810
	3b Absorption, %	2.4	1.9	1.8	3.4	3.2
	4 LA Abrasion % C131	26.8	27.2	27.8		
	5 Fractured Faces %	100	100	100		
	6 Liquid Limit D4318				0	0
	7 Plasticity				Non-Plastic	Non-Plastic
	8 Soundness Loss %, C88	1.2	1.4	1.9	3.8	3.6
9	Organic Impurities, C40				None	None
	10 Clay Lumps and Friable Particles, C142	0.3	0.5	0.7	0.2	0.3



**PORLTAND LIMESTONE CEMENT CONFORMING TO
ASTM C595/C595M-21 TYPE IL, SCG Bangkok Thailand**

Physical properties	Unit	Specification	Test Results	Test Method
Air content of mortar	%	12 Max	9.2	ASTM C 185
Autoclave expansion	%	0.80 Max	0.03	ASTM C151/C151M
Blaine	cm ² /g	A	4430	ASTM C 204
Mass density	g/cm ³	A	3.14	ASTM C 188
Heat of Hydration	J/g(cal/g)	**	301	ASTM C1702
Mortar Bar Expansion *	%	< 0.020	0.004	ASTM C1038
Sulfate Resistance	%	0.10 Max ***	0.07	ASTM C1012
Compressive Strength				
3 days	PSI/MPa	1890 (13.0)	5670 (39.1)	ASTM C 109/C109M
7 days		2900 (20.0)	6360 (43.8)	
28 days		3620 (25.0)	7480 (51.5)	
Time of setting (Vicat)				
Initial set	Minutes	45 Min	110	ASTM C 191
Final set		420 Max	200	
Retained content on				
.+Sieve 45µm	%	10.0 Max	0.75	ASTM C 430
Chemical properties				
MgO	%	A	1.1	ASTM C114
SO ₃	%	3.0 Max*	2.6	
Loss on ignition (LOI)	%	10 Max	4.78	
Insoluble Residue	%	A	Mill Cert-0.27	
Limestone in cement	%	5.0-15.0	8.47	
CaCO ₂ in Limestone	%	70 or >	94.11	
SiO ₂	%	A	19.0	
Al ₂ O ₃	%	A	4.1	
Fe ₂ O ₃	%	A	2.9	
CaO	%	A	64.7	
K ₂ O	%	A	0.44	
Na ₂ O	%	A	0.14	
R ₂ O (Total alkalies)	%	A	0.43	
Chloride content	%	A	0.04	

Remark:

April 22, 2025

This cement meets ASTM C595 and AASHTO M240 Specification
for Type IL Portland Limestone Cement.

Daniel K. Paaaina III

Chemist

A = Not applicable.

* = Default table maximum may be exceeded if C1038/C1038M limit is met.

** = Meets 3d Moderate Heat - MH

***=Meets 180d Moderate Sulfate - MS



Cement Division

MEMO

Date: April 5, 2023

To: Hawaiian Cement Customers

From: Darren Orr

Subject: Type 1L Cement Update

Hawaiian Cement is committed to providing a quality and consistent cement product to the State of Hawaii as we do our part to meet the cement industry's NetZero CO2 emissions goal by 2050. To do this, we have tested Type 1L cement from several suppliers over multiple samples to validate quality and consistency. We have also personally visited each cement plant under consideration to ensure the plant adheres to quality, consistency, environmental and safety standards.

Additionally, Hawaiian Cement must consider other factors when deciding on a supplier including customer testing feedback, costs, ship type availability, and contract flexibility. Each plant must also meet the logistical demands we impose on them as a supplier.

Although we have not made the final supplier selection, our intent is to begin transitioning over to Type 1L cement as early as October- November 2023, but no later than the end of the first quarter of 2024. During this transition, it is our goal to limit the impact on customers.

We will continue to update you on this transition. Please feel free to contact our Cement Sales Department for any questions you may have.

Portland-Limestone Cement

U.S. Fact Sheet

A lower carbon cement that has already reduced CO₂ emissions in the U.S. by more than 325,000 metric tons is available now, which is equivalent to the carbon stored in over 400,000 acres of forest for a year. And that's just the beginning.

Portland-limestone cement, or PLC, is engineered with a higher limestone content than portland cement to reduce the carbon footprint of concrete by about 10%. It performs just like the cement you're used to using, resulting in the same concrete you're used to having. The same specifications, the same mix design, now with a better carbon profile.

Concrete is everywhere. In fact, other than water, it's the most-used material on the planet, representing about 50% of all manmade materials (by mass). It's a versatile, economical construction material that is the basis for everything we build. Foundations. Buildings. Roads. Water and waste storage and delivery structures. Modern society is possible thanks to the versatility and widespread availability of concrete.

Because society places so much concrete each year, even small changes to its formulation can have dramatic effects on the construction industry's annual carbon footprint. Modifying a concrete mix design to replace higher carbon materials with lower carbon ingredients is an effective strategy. Portland-limestone cement offers an easy way for concrete producers to accomplish this, much like fly ash and slag cement have done for decades. And concrete mixes designed with PLCs are compatible with all supplementary cementing materials (SCMs), so when you substitute PLC for ordinary portland cement, you can continue to use all the other materials you use to make concrete for an even greater reduction in carbon footprint.

Applications and Uses

Almost anywhere you use ordinary portland cement, you can use PLC instead. In the U.S., PLCs have an established track record for transportation infrastructure. Many states have been placing PLC concrete pavements for more than a decade – with good results. From highways to driveways, PLC performs just as well in heavy-duty pavements as it does for residential flatwork. And it's appropriate for bridge applications, too, from top to bottom, everything from the deck down to the foundation, even including geotechnical work. For buildings, PLC concrete is a natural fit for structural members of any type or size, and it's also great for exterior finishes and hardscaping. Architects and other designers who are tasked with meeting goals put forth by green rating systems or codes will find PLC an especially useful approach to help them achieve a lower carbon footprint for any project.

Easy to Use at a 1:1 Cement Replacement

To help with the transition to more environmentally friendly concrete, cement manufacturers understand that the switch to PLC must be simple. By optimizing PLCs, they have made it easy for specifiers, producers, and installers to use them. PLC can be swapped in for portland cement at a 1:1 replacement level. This is a big help to ready mix producers, who can continue operations using their well-established systems with a minimal amount of disruption.

In most cases, all that is needed for maintaining fresh concrete behavior is typical tweaking of proportions or admixtures, similar to changing from one source of cement to another. Anyone who knows how to work with cement and concrete knows how to work with PLC concrete.

Extensively Tested for Similar Production, Handling, and Durability

Portland-limestone cement and concrete mixes containing PLC have been used around the world for decades. However, PLC has also been subjected to extensive research and testing by industry, both in the U.S. and elsewhere. Researchers have studied fresh properties related to placing and finishing, as well as hardened properties that relate to durability.

As noted, cement producers optimize PLC products so that they perform in the same way as portland cement because that's what their customers expect: fresh properties that enable similar handling and placing characteristics and hardened properties to assure good long-term performance in any type of exposure.

Durability is usually first demonstrated by accelerated laboratory testing and backed up by observation of field performance over time. Areas studied include resistance to scaling and freeze-thaw, chlorides, sulfates, and alkali-silica reaction. Each type of exposure has been thoroughly investigated to confirm that PLC produces strong, durable concrete.

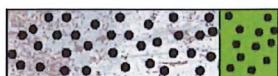
Manufactured with Lower CO2

Cement is made by grinding clinker—the main energy intensive ingredient—to a fine powder. Cement producers know that replacing some of the clinker in portland cement with ground limestone offers benefits, the most important being that it reduces the embodied CO2 of the cement. Whereas the U.S. standard for portland cement allows for up to 5% of clinker to be replaced by limestone, the standard for blended cement allows for 5% to 15% limestone replacement in PLC. Either way, the same clinker is used to make portland cement and portland-limestone cement. There's just less of it in PLC.

Portland cement can contain up to 5% limestone along with the clinker.



Portland-limestone cement can contain from 5% to 15% limestone along with the clinker.



To assure similar performance in concrete, manufacturers optimize PLCs by grinding them a bit finer than portland cement. The limestone particles can pack closer together to tighten the concrete matrix and their finer grind makes them slightly more reactive. And with the particles distributed throughout the mix, they can provide additional “nucleation” sites for chemical reactions to take place. All of this helps control strength development, ultimate strength, and is beneficial to concrete performance in other ways, too, such as helping to reduce permeability.

Adoption in U.S. Building Codes... And More

The cement industry has made great strides with other agencies toward the acceptance of PLC, allowing the U.S. to transition to environmentally friendlier concrete. ACI 318, Building Code Requirements for Structural Concrete, includes PLCs in the same way as portland and other blended cements. Along with code recognition, PLCs were similarly included in ACI 301, Specification for Structural Concrete. In addition to inclusion in ACI standards, PLCs are recognized by the International Code Council, the Federal Aviation Authority, and the American Institute of Architects Master Spec.

Reference standards for ready mixed concrete, ASTM C94, Specification for Ready Mixed Concrete, treat PLCs in the same way as other blended cements that have been used for decades. Cement standards in the U.S. (ASTM C595, AASHTO M 240) and Canada (CSA A3001) have recognized portland-limestone cements for about a decade. And even before that, some manufacturers were producing PLCs under the performance specification for cement (C1157). Though these are innovative, PLCs are not new products.

Doing More to Reduce Carbon Emissions (or GHGs)

By simply specifying PLC instead of ordinary portland cement, you can typically achieve a reduction of about 10% of the CO2 footprint for concrete. (The exact amount depends on each cement manufacturer's formulations.) For the best understanding of your CO2 savings with PLC, ask your cement provider.

Since the 1970s, improvements to U.S. cement manufacturing have resulted in a more than 40% decrease in production energy while also reducing CO2. The innovation of PLC can be viewed as yet another improvement in a long line of developments introduced by the cement industry to lower its energy and carbon footprints: converting wet kilns to dry kilns to reduce the energy for combustion, adding preheaters and precalciners to cement kilns to improve energy efficiency, and using waste for energy to reduce the burden on landfills.

As society looks to the future, cement manufacturers can offer a major contribution on the part of the construction industry to help address global climate change. PLC offers specifiers, architects, engineers and designers a new way to think about concrete while still offering the resilience and sustainability they've come to expect from it. ■



How do I specify PLC?

Specifying PLC for use in concrete is not complicated. PLC is a direct replacement for ordinary portland cement (OPC), so it only requires one change to project specifications: Refer to **ASTM C595 Type II** instead of ASTM C150 Type I portland cement. **It's that simple.** If the concrete requires special properties, such as sulfate resistance, see “What if my concrete requires special properties?” below.

DOT Construction using AASHTO Specifications

For some state DOT construction, specifications developed by the American Association of State Highway Transportation Officials (AASHTO) are used instead of ASTM. AASHTO M 85 is the specification for portland cements; AASHTO M 240 is specification for blended cements. The technical provisions of AASHTO M 85 and M 240 are the same as those of ASTM C150 and C595 respectively, so switching to PLC just requires reference to an M 240 Type II cement instead of M 85 Type I. Just as with C150/C595, similar special cement types are available— see “What if my concrete requires special properties?” below.

American Institute of Architects (AIA) MasterSpec

AIA MasterSpec includes PLC as an option under the Blended Hydraulic Cement entry. MasterSpec Section 0330000 on Cast-in-Place Concrete includes the following options in Section 2.5D on Cementitious Materials:

Portland Cement: ASTM C 150/C150M, [Type I] [Type II] [Type I/II]
[Type III] [Type V], [gray] [white]

Blended Hydraulic Cement: ASTM C 595/C595M, [Type IS, portland
blast-furnace slag] [Type IP, portland-pozzolan] [Type II,
portland-limestone] [Type IT, ternary blended] cement.

Federal Aviation Administration (FAA) Specification

For airport construction, PLC is permitted under FAA Advisory Circular AC 150AC No: 150/5370-10H, Standard Specifications for Construction of Airports. Item P-501, Cement Concrete Pavements, includes the following text with the option to use Type II cements:

501-2.2 Cement. Cement shall conform to the requirements of ASTM [] Type [].

The Engineer shall specify all of the following that are acceptable for use on the project:

ASTM C150 - Type I, II, or V.

ASTM C595 - Type IP, IS, II.

ASTM C1157 - Types GU, HS, MH.

Other cements may be specified with concurrence of the FAA.

Canadian Specifications

Canada has two categories for portland-limestone cements, and both are specified under CSA A3000, Cementitious Materials Compendium. This is a bit different than how the U.S. handles PLCs. Under CSA A3000, Type GUL, meaning “General Use-Limestone” is a portland-limestone cement and that standard has another category for portland-limestone *blended* cements, which include SCMs in addition to the ground limestone. These are specified, for example, as Type GULb, with the designation meaning “General Use-Limestone blended” cement. In Canada, for other portland-limestone cements and their blended counterparts that are used for concrete with special properties, refer to the [CSA Group](#).

Testing Requirements and Cement Qualifiers for PLCs and PLC Mixes

If I add PLC to my specifications, is any testing required?

It is recommended that trial batching be performed to confirm expected fresh and hardened performance, just as if a new source of portland cement was being used. Because PLCs are optimized to provide the same type of performance in concrete, your mix designs are likely to remain unchanged. Some minor adjustments may be needed, like dialing in admixture dosages or tweaking aggregate content.

What if my concrete requires special properties?

If special properties such as moderate sulfate resistance are required, a qualifier is added to the IL designation. The table below shows a comparison of OPC vs. PLC to meet special properties for cements specified by either ASTM C150 or C595, or their counterparts from AASHTO, M 85 or M 240.

Cement type	OPC C150 (M 85)	PLC C595 (M 240)
General use	I	IL
moderate sulfate resistance*	II, II(MS)	IL(MS)
moderate heat of hydration	II(MH)	IL(MH)
high sulfate resistance*	V	IL(HS)
low heat of hydration	IV	IL(LH)

*For additional sulfate resistance, SCMs can be used in the concrete mix.

Sulfate resistance. Cements with moderate and high sulfate resistance are only required when exposures warrant that. Although some Type IL cements can meet sulfate resistance requirements without SCMs, in general, the same techniques that protect Type I cement

mixtures against sulfate exposure are used to protect Type IL mixtures: use additional supplementary cementitious materials (SCMs) and low water-to-cementitious materials ratios to improve sulfate resistance. Guidance on this is provided in ACI 318, *Building Code Requirements for Structural Concrete and Commentary*. If there is no sulfate exposure, the (MS) or (HS) designations are not needed.

Heat of hydration (HOH). Moderate and low HOH designations (MH) and (LH) are generally only needed for mass placements, when the concrete member is greater than about a meter (yard) thick. If heat is not rapidly dissipated in massive members, a significant rise in concrete temperature can occur, *potentially* leading to non-uniform cooling of the concrete and creating excessive tensile stresses. Elevated concrete temperatures during curing (more than 70°C (about 158°F)) may also trigger a distress mechanism known as “DEF” (delayed ettringite formation). DEF has been associated with reduced service life for concrete. On the other hand, a rise in concrete temperature caused by HOH is often beneficial in cold weather, if it helps maintain favorable curing temperatures.

Heat of hydration characteristics of OPC and PLC are assessed using the same test (ASTM C1702) and the same limits apply. As cements with special properties may not be routinely produced in all areas, it is recommended that their availability be verified when needed.

Master Builders Solutions Admixtures US, LLC

February 21, 2025

Jas Glover LTD
890 Leilani St
Hilo
HI 96720

Attention: Garrick Campbell

Project: COC

Project location: Hilo

Certificate of Conformance

MasterPozzolith® 322

Master Builders Solutions Admixture

I, Richard Hubbard, Sr. Technical Marketing Specialist for Master Builders Solutions, Cleveland, Ohio, certify:

That MasterPozzolith 322 admixture is a Master Builders Solutions Water-Reducing Admixture for concrete; and

That MasterPozzolith 322 and Pozzolith 322N admixture are the same product having identical composition, differing only in designation; and

That no calcium chloride or chloride based ingredient is used in the manufacture of MasterPozzolith 322 admixture; and

That MasterPozzolith 322 admixture, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00024 percent (2.4 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and

That MasterPozzolith 322 admixture meets the requirements for a Type A, Water Reducing, Type B, Retarding, and Type D, Water Reducing and Retarding Admixture specified in ASTM C494/C494M and AASHTO M194, the Standard Specification for Chemical Admixtures for Concrete, as well as the requirements for Type A, Type B and Type D admixtures as specified in Corps of Engineers' CRD-C 87.



Richard Hubbard
Sr. Technical Specialist

03 30 00	Cast-in-Place Concrete
03 40 00	Precast Concrete
03 70 00	Mass Concrete

MasterPozzolith® 322

Water-Reducing Admixture

Description

MasterPozzolith 322 ready-to-use, liquid admixture is used for making more uniform and predictable quality concrete. It meets ASTM C 494/C 494M requirements for Type A, water-reducing, Type B, retarding, and Type D, retarding and water-reducing, admixtures.

Applications

Recommended for use in:

- Prestressed concrete
- Precast concrete
- Reinforced concrete
- Shotcrete
- Lightweight concrete
- Pumped concrete
- 4x4™ Concrete
- Pervious concrete
- Self-consolidating concrete (SCC)

Features

- Reduced water content required for a given workability
- Normal setting characteristics

Benefits

- Improved workability
- Reduced segregation
- Superior finishing characteristics for flatwork and cast surfaces
- Increased compressive and flexural strengths

Performance Characteristics

Mix Data: 400 lb/yd³ (237 kg/m³) of Type I cement; slump 5 inches (125 mm); non-air-entrained concrete; concrete temperature 76 °F (24 °C); ambient temperature 74 °F (23 °C).

Setting Time

Mix Design	Initial Set (h:min)	Difference (h:min)
Plain Concrete	5:20	REF
MasterPozzolith 322 admixture @		
3 fl oz/cwt (195 mL/100 kg)	5:15	-0:05
5 fl oz/cwt (325 mL/100 kg)	5:40	+0:20
7 fl oz/cwt (460 mL/100 kg)	6:20	+1:00

Compressive Strength

Mix Design	psi	7 Days			28 Days		
		MPa	%	psi	MPa	%	
Plain Concrete	2150	14.8	100	3070	21.2	100	
MasterPozzolith 322 admixture @							
3 fl oz/cwt (195 mL/100 kg)	2820	19.4	131	3970	27.4	129	
5 fl oz/cwt (325 mL/100 kg)	3160	21.8	147	4100	28.3	134	
7 fl oz/cwt (460 mL/100 kg)	3190	22.0	148	4390	30.3	143	

Note: The data shown are based on controlled laboratory tests. Reasonable variations from the results shown here may be experienced as a result of differences in concrete-making materials and jobsite conditions.

Setting time of concrete is influenced by the chemical and physical composition of the basic ingredients of the concrete, the temperature of the concrete and the climactic conditions. Trial mixes should be made with job site materials to determine the dosage required for specified setting time and a given strength requirement.

Guidelines for Use

Dosage: MasterPozzolith 322 admixture is recommended for use within a range of 3-7 fl oz/cwt (195-460 mL/100 kg) of cement for most concrete mixtures using average concrete ingredients. Because of variations in job conditions and concrete materials, dosages other than the recommended amounts may be required. In such cases, contact your local sales representative.

Product Notes

Corrosivity – Non-Chloride, Non-Corrosive: MasterPozzolith 322 admixture will neither initiate nor promote corrosion of reinforcing steel in concrete. This admixture does not contain intentionally-added calcium chloride or other chloride-based ingredients.

Compatibility: MasterPozzolith 322 admixture may be used in combination with any Master Builders Solutions admixtures. When used in conjunction with other admixtures, each admixture must be dispensed separately into the mixture.

Storage and Handling

Storage Temperature: MasterPozzolith 322 admixture should be stored above freezing temperatures. If MasterPozzolith 322 admixture freezes, thaw at temperatures above 35 °F (2 °C) and completely reconstitute by mild mechanical agitation. **Do not use pressurized air for agitation.**

Shelf Life: MasterPozzolith 322 admixture has a minimum shelf life of 18 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your local sales representative regarding suitability for use and dosage recommendations if the shelf life of MasterPozzolith 322 admixture has been exceeded.

Packaging

MasterPozzolith 322 admixture is supplied in 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

Related Documents

Safety Data Sheets: MasterPozzolith 322 admixture

Additional Information

For additional information on MasterPozzolith 322 admixture, contact your local sales representative.

Master Builders Solutions, a brand of MBCC Group, is a global leader of innovative chemistry systems and formulations for construction, maintenance, repair and restoration of structures. The Admixture Systems business provides advanced products, solutions and expertise that improve durability, water resistance, energy efficiency, safety, sustainability and aesthetics of concrete structures, above and below ground, helping customers to achieve reduced operating costs, improved efficiency and enhanced finished products.

Utilizing worldwide resources, the Master Builders Solutions community of experts are passionate about providing solutions to challenges within all stages of construction, as well as the life cycle of a structure. At Master Builders Solutions we create sustainable solutions for construction around the globe.

Limited Warranty Notice

Master Builders Solutions Admixtures US, LLC ("Master Builders Solutions") warrants this product to be free from manufacturing defects and to meet the technical properties on the current Technical Data Guide, if used as directed within shelf life. Satisfactory results depend not only on quality products but also upon many factors beyond our control. **MASTER BUILDERS SOLUTIONS MAKES NO OTHER WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ITS PRODUCTS.** The sole and exclusive remedy of Purchaser for any claim concerning this product, including but not limited to, claims alleging breach of warranty, negligence, strict liability or otherwise, is shipment to purchaser of product equal to the amount of product that fails to meet this warranty or refund of the original purchase price of product that fails to meet this warranty, at the sole option of Master Builders Solutions. Any claims concerning this product must be received in writing within one (1) year from the date of shipment and any claims not presented within that period are waived by Purchaser. **MASTER BUILDERS SOLUTIONS WILL NOT BE RESPONSIBLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFITS) OR PUNITIVE DAMAGES OF ANY KIND.**

Purchaser must determine the suitability of the products for the intended use and assumes all risks and liabilities in connection therewith. This information and all further technical advice are based on Master Builders Solutions' present knowledge and experience. However, Master Builders Solutions assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights, nor shall any legal relationship be created by or arise from the provision of such information and advice. Master Builders Solutions reserves the right to make any changes according to technological progress or further developments. The Purchaser of the Product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with a full application of the product(s). Performance of the product described herein should be verified by testing and carried out by qualified experts.



Master Builders Solutions Admixtures US, LLC

February 21, 2025

Jas Glover LTD
890 Leilani St
Hilo
HI 96720

Attention: Garrick Campbell

Project: COC

Project location: Hilo

Certificate of Conformance

MasterSet® DELVO

Master Builders Solutions Admixture for Concrete

I, Richard Hubbard, Sr. Technical Marketing Specialist for Master Builders Solutions, Cleveland, Ohio, certify:

That MasterSet DELVO admixture is a Master Builders Solutions Hydration Controlling Admixture for concrete; and

That MasterSet DELVO admixture and DELVO Stabilizer admixture are the same product having identical composition, differing only in designation; and

That no calcium chloride or chloride based ingredient is used in the manufacture of MasterSet DELVO admixture and

That MasterSet DELVO admixture, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00014 percent (1.4 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and

That MasterSet DELVO admixture meets the requirements for a Type B, Retarding and Type D, Water-Reducing and Retarding Admixture specified in ASTM C494/C494M, the Standard Specification for Chemical Admixtures for Concrete, as well as the requirements for Tyep B and Type D admixtures as specified in Corps of Engineers' CRD-C 87 and AASHTO M194.



Richard Hubbard
Sr. Technical Specialist

03 30 00	Cast-in-Place Concrete
03 40 00	Precast Concrete
03 70 00	Mass Concrete

MasterSet® DELVO

Hydration Controlling Admixture

Description

MasterSet DELVO ready-to-use, liquid admixture is used for making more uniform and predictable high-performance concrete. MasterSet DELVO admixture retards setting time by controlling the hydration of portland cement and other cementitious materials while facilitating placing and finishing operations. MasterSet DELVO admixture meets ASTM C 494/C 494M requirements for Type B, retarding, and Type D, water-reducing and retarding, admixtures.

Applications

Recommended for use in:

- Stabilization of concrete washwater
- Stabilization of returned plastic concrete
- Stabilization of freshly batched concrete for long hauls
- 4x4™ Concrete
- Pumped concrete, shotcrete (wet mix) and conventionally-placed concrete
- Plain, reinforced, precast, prestressed, lightweight and normal weight concrete
- Pervious concrete

Features

- Reduced water content required for a given workability
- Retarded setting time characteristics
- Improved workability

Benefits

- Provides flexibility in the scheduling of placing and finishing operations
- Offsets the effects of slump loss during extended delays between mixing and placing
- Reduces waste associated with concrete washwater and returned concrete
- Increased strength – compressive and flexural

Performance Characteristics

Rate of Hardening: The temperature of a concrete mixture and the ambient temperature (forms, earth, air, etc.) affect the hardening rate of concrete. At higher temperatures, concrete hardens more rapidly which may cause problems with placing and finishing.

One of the functions of MasterSet DELVO admixture is to retard the set of concrete. Within the normal dosage range, it will generally extend the working and setting times of concrete containing normal portland cement, fly ash, slag cement and silica fume approximately 1 hour to 5 hours compared to a plain concrete mixture. This depends on job materials and temperatures. Trial mixtures should be made under approximate job conditions to determine the dosage required.

Compressive Strength: Concrete produced with MasterSet DELVO admixture will develop higher early (within 24 hours) and higher ultimate strengths than plain concrete when used within the recommended dosage range and under normal, comparable curing conditions. When MasterSet DELVO admixture is used in heat-cured concrete, the length of the preheating period should be increased until the initial set of the concrete is achieved. The actual heat-curing period is then reduced accordingly to maintain existing production cycles without sacrificing early or ultimate strengths.

Guidelines for Use

Dosage: MasterSet DELVO admixture is recommended for use at a dosage of 4 ± 1 fl oz/cwt (260 ± 65 mL/100 kg) of cementitious materials for most concrete mixtures using average concrete ingredients. For long time-to-discharge applications, such as long hauls, dosages higher than the recommended range may be required. Specifically, for shotcrete applications, MasterSet DELVO admixture is recommended for use at a dosage of 1.5 fl oz/cwt to 25 fl oz/cwt (100 mL/100 kg to 1,500 mL/100 kg) of cementitious materials. Because of variations in job conditions and concrete materials, dosages other than the recommended amounts may be required. In such cases, contact your local sales representative. For concrete washwater and returned concrete stabilization, utilize MasterSet DELVO charts to determine the appropriate dosage rates.

Product Notes

Corrosivity – Non-Chloride, Non-Corrosive: MasterSet DELVO admixture will neither initiate nor promote corrosion of reinforcing steel in concrete. This admixture does not contain intentionally-added calcium chloride or other chloride-based ingredients.

Compatibility: MasterSet DELVO admixture may be used in combination with any BASF admixture. When used in conjunction with another admixture, each admixture must be dispensed separately into the mixture.

Storage and Handling

Storage Temperature: MasterSet DELVO admixture should be stored above freezing temperatures. If MasterSet DELVO admixture freezes, thaw at 35 °F (2 °C) or above and completely reconstitute by mild mechanical agitation. Do not use pressurized air for agitation.

Shelf Life: MasterSet DELVO admixture has a minimum shelf life of 12 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your local sales representative regarding suitability for use and dosage recommendations if the shelf life of MasterSet DELVO admixture has been exceeded.

Packaging

MasterSet DELVO admixture is supplied in specially designed 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

Related Documents

Safety Data Sheets: MasterSet DELVO admixture

Additional Information

For more information on MasterSet DELVO admixture, contact your local sales representative.

The Admixture Systems business of BASF's Construction Chemicals division is the leading provider of solutions that improve placement, pumping, finishing, appearance and performance characteristics of specialty concrete used in the ready-mixed, precast, manufactured concrete products, underground construction and paving markets. For over 100 years we have offered reliable products and innovative technologies, and through the Master Builders Solutions brand, we are connected globally with experts from many fields to provide sustainable solutions for the construction industry.

Limited Warranty Notice

BASF warrants this product to be free from manufacturing defects and to meet the technical properties on the current Technical Data Guide, if used as directed within shelf life. Satisfactory results depend not only on quality products but also upon many factors beyond our control. BASF MAKES NO OTHER WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ITS PRODUCTS. The sole and exclusive remedy of Purchaser for any claim concerning this product, including but not limited to, claims alleging breach of warranty, negligence, strict liability or otherwise, is shipment to purchaser of product equal to the amount of product that fails to meet this warranty or refund of the original purchase price of product that fails to meet this warranty, at the sole option of BASF. Any claims concerning this product must be received in writing within one (1) year from the date of shipment and any claims not presented within that period are waived by Purchaser. BASF WILL NOT BE RESPONSIBLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFITS) OR PUNITIVE DAMAGES OF ANY KIND.

Purchaser must determine the suitability of the products for the intended use and assumes all risks and liabilities in connection therewith. This information and all further technical advice are based on BASF's present knowledge and experience. However, BASF assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights, nor shall any legal relationship be created by or arise from the provision of such information and advice. BASF reserves the right to make any changes according to technological progress or further developments. The Purchaser of the Product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with a full application of the product(s). Performance of the product described herein should be verified by testing and carried out by qualified experts.

Workplan



Contractor's License No. ABC1036

MAIN OFFICE: 648 PIILANI STREET, PO BOX 4669, HILO, HAWAII 96720
PHONE (808) 935-7194 FAX (808) 961-6417

KONA BRANCH: 74-5039B QUEEN KAAHUMANU HWY, PO BOX 3169, KAILUA-KONA, HI 96740
PHONE (808) 329-8051 FAX (808) 329-3261

ESTABLISH 1926

An Equal Opportunity Employer

July 1, 2025

Hilo WWTP Rehabilitation & Replacement Project Phase 1
Probe & Grout Work Plan

Probing:

- 1) Layout of Probe Holes by others
- 2) Depth to drill to be provided by other
- 3) Using a track drill with a 3" bit we will drill to the specified depth
- 4) Documentation and log of probe hole by others
- 5) The hole will be plugged with a PVC plug
- 6) Description of the track drill is attached

Grouting with Concrete Boom Pump Truck:

- 1) Grouting to be performed with an operated 38 Meter Boom Pump Truck
- 2) Boom Pump Pipe to be reduced down to a 2" PVC Pipe to insert into probe hole
- 3) A Laborer will assist with the pipe placement
- 4) Grout to be pumped into hole per direction of the QC Specialist and/or Soils Engineer by others
- 5) Track Drill to standby while grouting, if necessary probe hole will be re-drilled at no cost
- 6) Documentation and log of grout by others
- 7) Recording Equipment by others
- 8) Grout mix to be per approved submittals
- 9) Description of Concrete Boom Pump Truck is attached
- 10) Extra grout disposal, concrete truck washout, and Boom Pump truck washout to be done at a designated concrete washout site constructed, maintained, and disposed of by others

Grouting with Boom Truck and Line Pump:

- 1) Grouting to be performed with an operated 33 Ton Boom Truck and Line Pump
- 2) Line Pump Pipe to be reduced down to a 2" PVC Pipe to insert into probe hole
- 3) Boom Truck to lift and place pipe into probe hole with two Laborers assisting
- 4) Grout to be pumped into hole per direction of the QC Specialist and/or Soils Engineer by others
- 5) Track Drill to standby while grouting, if necessary probe hole will be re-drilled at no cost
- 6) Documentation and log of grout by others
- 7) Recording Equipment by others
- 8) Grout mix to be per approved submittals
- 9) Description of 33 Ton Boom Truck is attached
- 10) Extra grout disposal, concrete truck washout, and Line Pump washout to be done at a designated concrete washout site constructed, maintained, and disposed of by others

38M

JXZZ 38-5.16



EQ#2172



GENERAL

PIPE SIZE (ID) **125 mm (5")**

BOOM CONTROL VALVE **Proportional (by HAWE)**

RADIO REMOTE **Dual Wireless Transmitter System**

VIBRATOR **Standard**

WATER PUMP **Hydraulic Power 20 bar (290 psi)**

WATER TANK **800 L (211 G)**

WEAR PARTS **Carbide**

- POPULAR UPGRADES[†]**
- LED Boom Light Kit
 - LED Outrigger Lights
 - Heated Water Tank
 - Heated Hydraulic Tank
 - Air-Cuff
 - Twin Wall Pipe
 - 20 Cell Pump Kit
 - 18 Cell Pump Kit

BOOM

NUMBER OF BOOMS **5 Sections**

FOLDING TYPE **ZZ Fold**

VERTICAL HEIGHT **37.5 m (123')**

HORIZONTAL REACH **33.5 m (109'11")**

UNFOLDING HEIGHT **7.3 m (23'11")**

1ST SECTION **7.8 m (25'7")**

2ND SECTION **6.1 m (20")**

3RD SECTION **6.3 m (20'8")**

4TH SECTION **6.6 m (21'8")**

5TH SECTION **6.7 m (22')**

OUTRIGGER **X-Style**

FRONT SPREAD **6.0 m (19'8")**

REAR SPREAD **7.8 m (25'7")**

PUMP

OUTPUT: **Rod Side 164 m³/h (215 yd³/h)**

Piston Side 102 m³/h (133 yd³/h)

PRESSURE: **Rod Side 72 Bar (1044 psi)**

Piston Side 115 bar (1668 psi)

CONCRETE CYLINDER DIAMETER **230 mm (9")**

CONCRETE CYLINDER TYPE **Hard Chromed**

STROKE LENGTH **2100 mm (83")**

S-TUBE SIZE **9" x 7"**

MAIN OIL PUMP **Rexroth hydromatic A11VLO260**

HYDRAULIC SYSTEM PRESSURE **350 bar (5076 psi)**

LUBE SYSTEM (HOPPER) **Automatic**

SWITCHING SYSTEM **Hydraulic**

HOPPER CAPACITY **Easy Clean 600 L (158 G)**

NUMBER OF STROKES/MIN **31**

OUTPUT CONTROL RANGE **10(13)-164m³/h (215yd³/h)**

[†]Not to be used through boom pipe

[†]More options available, ask your sales rep for details.

Alliance Concrete Pumps Inc. reserves the right to make changes to all specifications

ALLIANCECONCRETEPUMPS.COM



USA OFFICE: 800 West Ridge Road, Linwood, PA 19061
Toll Free 1.888.584.7231 | Phone 610.584.7231 | Fax 610.584.7251

CANADA OFFICE: 26162 30A Avenue, Aldergrove, BC V4W 2W5
Toll Free 1.888.870.0908 | Phone 604.607.0908 | Fax 604.607.0903



38M WEIGHTS/DIMENSIONS

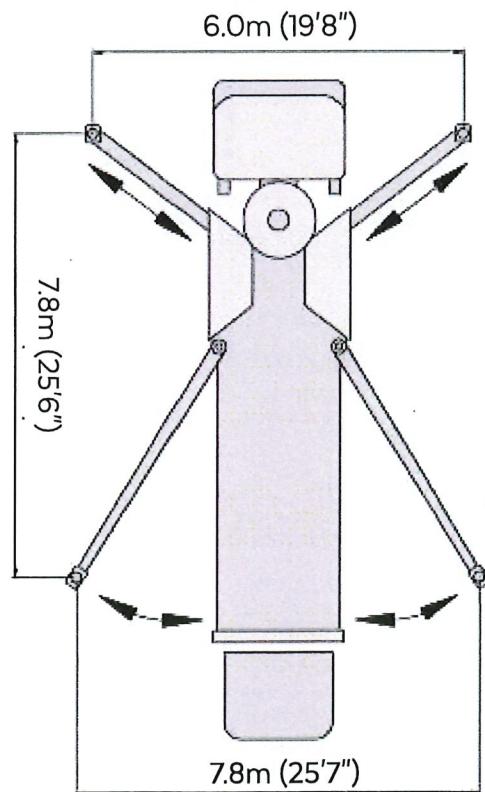


CHASSIS

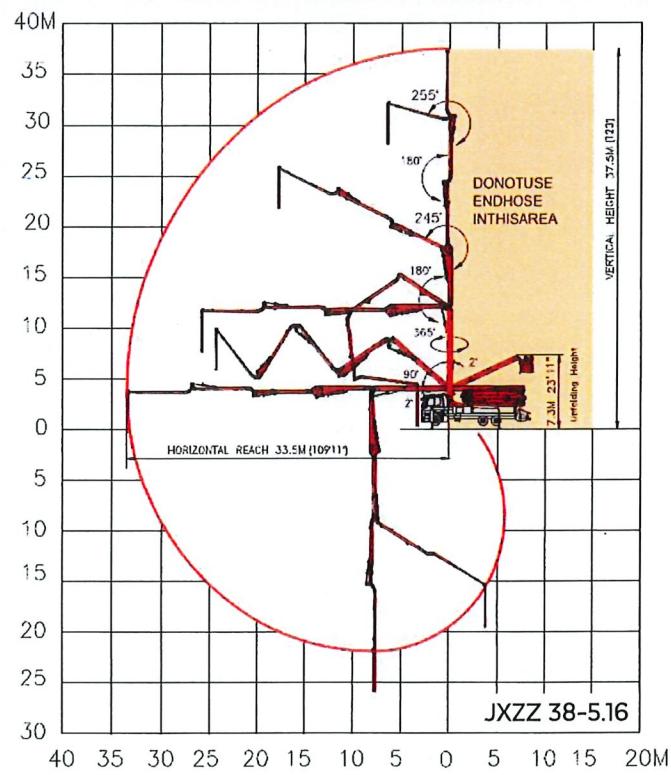
MAKE/MODEL	FRONT AXLE	REAR AXLE	OVERALL LENGTH	TOTAL WEIGHT
LARGE CONVENTIONAL	18,300 lbs	43,800 lbs	39'2" / 11.94m	62,100 lbs
CAB OVER	19,900 lbs	40,500 lbs	36'10" / 11.25m	60,400 lbs

DIAGRAMS

OUTRIGGER EXTENSION



BOOM PUMP REACH



Grove Manitowoc National Crane Potain



EQ# 2204

33 Ton Boom Truck

National Crane Series 1400H

Product Guide



Features

- 29,9 t (33 USt) rating
- 38,72 m (127 ft) five-section boom
- Self-lubricating Easy Glide wear pads
- Internal anti-two-block



Features

National Crane 1400H

- 29,9 t (33 USt) maximum capacity
 - 50,3 m (165 ft) maximum vertical reach*
 - 41,15 m (135 ft) maximum vertical hydraulic reach
- *Maximum vertical reach is ground-level to boom tip height at maximum extension and angle with outriggers/stabilizers full extended.



Five-section boom

At 38,72 m (127 ft), the Series 1400H five-section boom is the longest in its size range. The long boom allows the operator to perform more lifts without the use of a jib, reducing setup time and improving efficiency.

Easy Glide boom wear pads

Easy Glide boom wear pads reduce the conditions that cause boom chatter resulting in smoother crane operation.



Overload protection

All National Crane boom trucks are equipped with overload protection. A Load Moment Indicator (LMI) is standard on all Series 1400H machines. The LMI display console is weatherproof. The LCD display is visible in full or low light and displays all crane load lifting values simultaneously.



Outriggers

Mainframe outriggers are crossframe H-style, with 7,47 m (24 ft 6 in) span, with a mid-span setting of 5,64 m (18 ft 6 in). Rear stabilizers are H-style with 5,64 m (18 ft 6 in) span. Removable ball and socket aluminum outrigger pads are included on mainframe outriggers.

Features

Best in class performance and serviceability

- The stronger standard torsion box improves rigidity, reduces truck frame flex and reduces the need for counterweight
- Speedy-reeve boom tip and sheave blocks simplify rigging changes by decreasing the time needed to change line reeving
- Crane components painted before assembly reduce the chance of rust, improve serviceability and enhance the appearance of the crane
- Internal anti-two block wiring standard on the 1400H routes the wiring through the inside of the boom eliminating the possibility of snagging the wire on obstructions
- Bearings on the boom and retract cables can be greased through access holes in the boom side plates and number of internal boom parts has been reduced improving serviceability
- The Series 1400H is supplied with 375° non-continuous rotation standard
- Adjustable swing speed comes standard on the 1400H. A control knob located on the swing motor brake release valve can be easily adjusted to the crane operator's swing speed preference
- Radiator mounted on truck frame with electric fan is standard



Contents

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Mounting configuration

The mounting configuration shown is based on the Series 1400H with an 85% stability factor. The complete unit must be installed in accordance with factory requirements and a test performed to determine actual stability and counterweight requirements since individual truck chassis vary. If bare truck weights are not met, counterweight will be required. Chassis must be equipped with a front frame extension suitable for SFO addition. Contact factory for complete chassis specifications.

Working area	360°
Gross Axle Weight Rating Front	9072 kg (20,000 lb)*	
Gross Axle Weight Rating Rear	18 144 kg (40,000 lb)*	
Gross Vehicle Weight Rating	27 216 kg (60,000 lb)*	
Wheelbase	Minimum 681 cm (268 in)	
Cab to Axle/trunnion (CA/CT)	Minimum 518 cm (204 in)	
After Frame (AF)	305 cm (120 in) minimum	
Frame Section Modulus (SM), front axle to end of afterframe, with (758 MPa 110,000 PSI)	492 cm ³ (30 in ³)	
Stability Weight, Front	4196 kg (9250 lb) minimum**	
Stability Weight, Rear	3674 kg (8100 lb) minimum**	
Estimated Average Final Weight	23 360 kg (51,500 lb)***	

The diagram shows the 360° working area that can be achieved with the front stabilizer (optional on the Series 1400H). The front stabilizer is required when extending the boom and lifting loads forward of the outriggers. A minimum of 164 cm³ (10 in³) section modulus at 759 MPa (110,000 psi) is required from the rear of the front spring hanger forward to the front stabilizer. Integral front frame extension required.

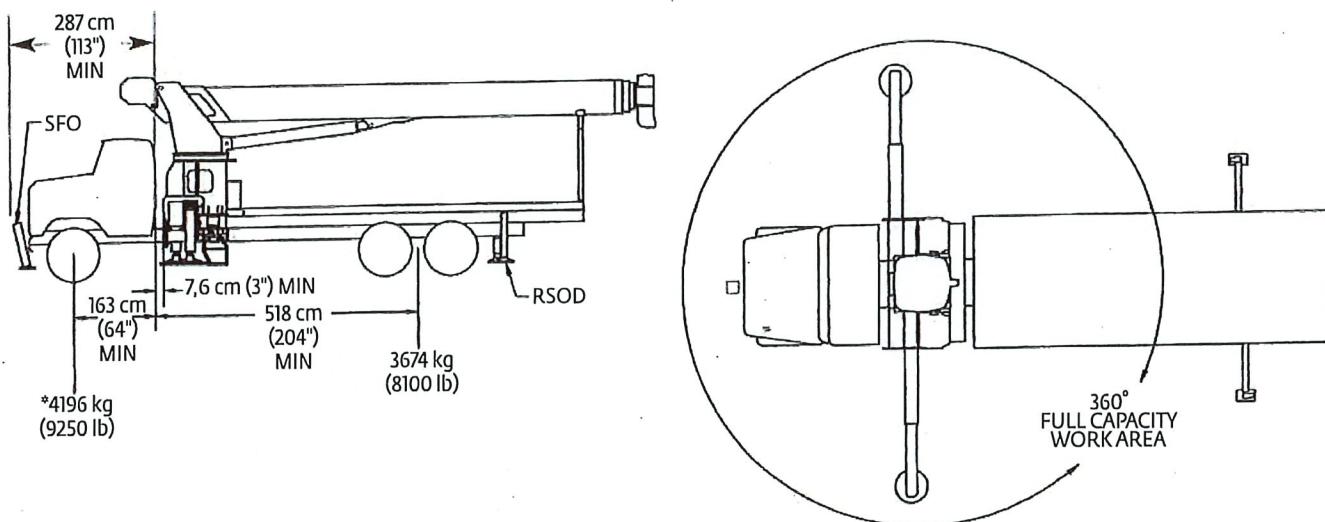
* Required to mount basic crane with 9,15 m (30 ft) jib option. Additional options or heavier bare chassis weights will require additional axles or a GVWR in excess of 27 216 kg (60,000 lb); in some states, special permits for overload are required.

** Estimated axle scale weights prior to installation of crane, stabilizers and subbase for 85% stability.

*** Includes basic crane without jib, 379 L (100 gal) fuel tank, 22 ft wood flatbed, hydraulic pump and PTO, rear bumper, rear stabilizer, boom rest, and two workers, 136 kg (300 lb) in cab.

Note: Chassis will require integral extended front frame rails for SFO addition.

Truck requirements



Notes:

- Gross Vehicle Weight Rating (GVWR) is dependent on all components of the vehicle (axles, tires, springs, frame, etc.) meeting manufacturers' recommendations; always specify GVWR when purchasing trucks.
- Diesel engines require a variable speed governor and energize-to-run fuel solenoid for smooth crane operation. Electronic fuel-injected engines are required.

- All mounting data is based on a National Series 1400H with the standard subbase and an 85% stability factor.
- The complete unit must be installed in accordance with factory requirements, and a test performed to determine actual stability and counterweight requirements per SAE J765; contact the factory for details.
- Transmission neutral safety interlock switch is required.

Specifications

Boom and jib combinations data

Model 14127H — Equipped with a 9,63 m - 38,72 m (31 ft 7 in - 127 ft) five-section boom. This model can be equipped with a 9,15 m (30 ft) single-section jib. Maximum tip height with 9,15 m (30 ft) jib is 50,00 m (164 ft).

9,63 m - 38,72 m (31 ft 7 in - 127 ft) five-section boom

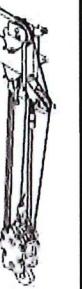
14FJ30M 9,15 m (30 ft) single-section jib

Note: Maximum tip is measured with outriggers/stabilizers fully extended.

Specifications

1400H winch data

- Do not deadhead line block against boom tip when extending boom
- Keep at least 3 wraps of loadline on drum at all times.
- Use only 5/8" in diameter rotation-resistant cable with 45,400 lb breaking strength on this machine.
- MAXIMUM BOOM LENGTH AT MAXIMUM ELEVATION WITH RIGGING SHOWN WITH LOAD BLOCK AT GROUND LEVEL

1 part line	2 part line	3 part line	4 part line	5 part line	6 part line	7 part line	8 part line
							
127 ft boom with 54 ft jib	110 ft	83 ft	64 ft	52 ft	43 ft	36 ft	31 ft

Winch	Cable supplied	Average breaking strength	Lift and speed	Lift and speed	Lift and speed	Lift and speed	Lift and speed	Lift and speed
Low speed	5/8" diameter rotation resistant	20 593 kg (45,400 lb)	4082 kg (9000 lb) 52 m/min (170 fpm)	8165 kg (18,000 lb) 26 m/min (85 fpm)	12 247 kg (27,000 lb) 17 m/min (57 fpm)	16 329 kg (36,000 lb) 13 m/min (43 fpm)	20 412 kg (45,000 lb) 10 m/min (34 fpm)	24 494 kg (54,000 lb) 9 m/min (28 fpm)
High speed	5/8" diameter rotation resistant	20 593 kg (45,400 lb)	1996 kg (4400 lb) 104 m/min (340 fpm)	3992 kg (8800 lb) 52 m/min (170 fpm)	5987 kg (13,200 lb) 34 m/min (113 fpm)	7983 kg (17,600 lb) 26 m/min (85 fpm)	9979 kg (22,000 lb) 21 m/min (68 fpm)	11 975 kg (26,400 lb) 17 m/min (57 fpm)

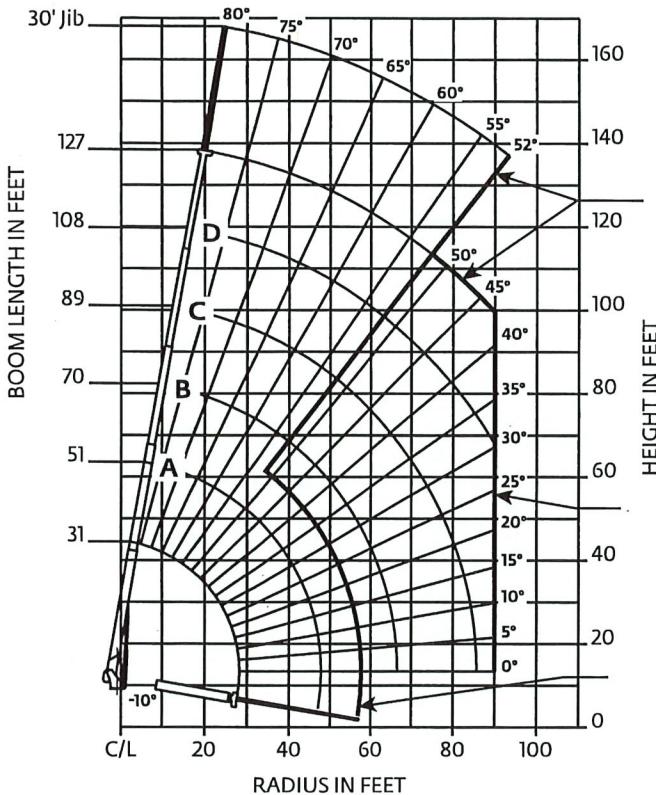
Winch	Full drum pull
Standard planetary	1996 kg (4400 lb) high speed 4082 kg (9000 lb) low speed

Loadline deduct		
Block type	Rating	Weight
Downhaul weight	4,53 t (5 USt)	82 kg (180 lb)
1-sheave block	13,60 t (15 USt)	170 kg (375 lb)
2-sheave block	22,67 t (25 USt)	290 kg (640 lb)
3-sheave block	31,74 t (35 USt)	395 kg (870 lb)
4-sheave block	32,65 t (36 USt)	440 kg (970 lb)

Capacities

**Series 14127H: 38.7 m (127 ft) boom with 9.1 m - 16.45 m (30 ft - 54 ft) jib/full-span outrigger
7.5 m (24 ft 6 in)**

Other Series 1400H Load Rating Charts are available. National Crane will send you a chart on request – or you may secure needed load rating information through your nearest National Crane dealer.



CAUTION:

- Do not operate crane booms, jib extensions, any accessories or loads within 10 ft (3 m) of live power lines or other conductors of electricity.
- Jib and boom capacities shown are maximum for each section.
- Do not exceed capacities at reduced radii.
- Load ratings shown on the appropriate charts are maximum allowable loads with the crane mounted on a factory-approved truck and all outriggers at either full span or at mid span range and set on a firm level surface so that the crane is level and all tires are suspended.
- Always level the crane with the level indicator located on the crane.
- The operator must reduce load to allow for factors such as wind, ground conditions, operating speeds and their effects on freely suspended loads.
- Overloading this crane may cause structural collapse or instability.
- Weights on any accessories attached to the boom or loadline must be deducted from the load chart capacities.
- Do not exceed jib capabilities at any reduced boom lengths.
- Do not deadhead lineblock against boom tip when extending boom or winching up.
- Keep at least three wraps of loadline on drum at all times.
- Use only specified cable with this machine.

NOTE:

1. Operate with jib by radius when main boom is fully extended. If necessary increase boom angle to maintain loaded radius.
2. Operate with jib by boom angle when main boom is not fully extended. Do not exceed rated jib capacities at any reduced boom lengths.

Load chart

LOAD RADIUS (ft)	LOADED BOOM ANGLE	31 ft BOOM (lb)	LOADED BOOM ANGLE	A 51 ft BOOM (lb)	LOADED BOOM ANGLE	B 70 ft BOOM (lb)	LOADED BOOM ANGLE	C 89 ft BOOM (lb)	LOADED BOOM ANGLE	D 108 ft BOOM (lb)	LOADED BOOM ANGLE	127 ft BOOM (lb)
6	79.9	66,000										
8	76	47,550										
10	71.9	40,750	79.7	32,700								
12	67.7	35,800	77.4	29,750								
15	61.1	30,200	72.8	25,900	78.1	22,550						
20	49.5	23,950	67.7	20,450	74.8	18,950	78.8	16,600				
25	33.1	17,700	61.2	16,750	70.4	15,350	74.7	14,200	78.1	12,250	80.3	8200
30			54.1	14,000	65.9	12,850	72.2	11,850	76.1	10,550	78.5	7900
35			46.2	10,550	61.1	10,650	68.6	9700	73.6	9050	76.4	7600
40			36.5	8100	55.2	8350	64.3	8300	69.8	7850	73.8	7200
45			25.7	6250	50.9	6500	61.5	6700	67.8	6750	71.5	6400
50					45	5100	57.4	5300	64.6	5400	69.5	5500
55					38.3	4000	53.2	4200	61.4	4300	66.8	4400
60					29.8	3150	48.1	3300	57.4	3400	63.6	3500
65					19.1	2400	44	2600	54.6	2700	61.3	2800
70							38.7	2000	51.1	2100	58.4	2150
75							32.6	1450	47.3	1550	55.5	1650
80							24.5	1000	43.2	1100	52.2	1200
85							14	650	38.9	750	49.4	800
90											45.6	500
	0	12,150	0	4800	0	2000	0	500				
ADD TO CAPACITIES WHEN NO JIB STOWED (lb)		500		300		250		200		150		100

LOAD RADIUS (ft)	LOADED BOOM ANGLE	30 ft JIB (lb)
30	79.9	3900
35	79.1	3850
40	77.5	3700
45	75.9	3550
50	74.2	3400
55	72.5	3250
60	70.7	3100
65	68.9	2950
70	66.4	2600
75	64.4	2050
80	62.1	1600
85	59.7	1200
90	57.3	850
95	54.8	550

*Shaded areas are structurally limited capacities.

THIS CHART IS ONLY A GUIDE AND SHOULD NOT BE USED TO OPERATE THE CRANE.

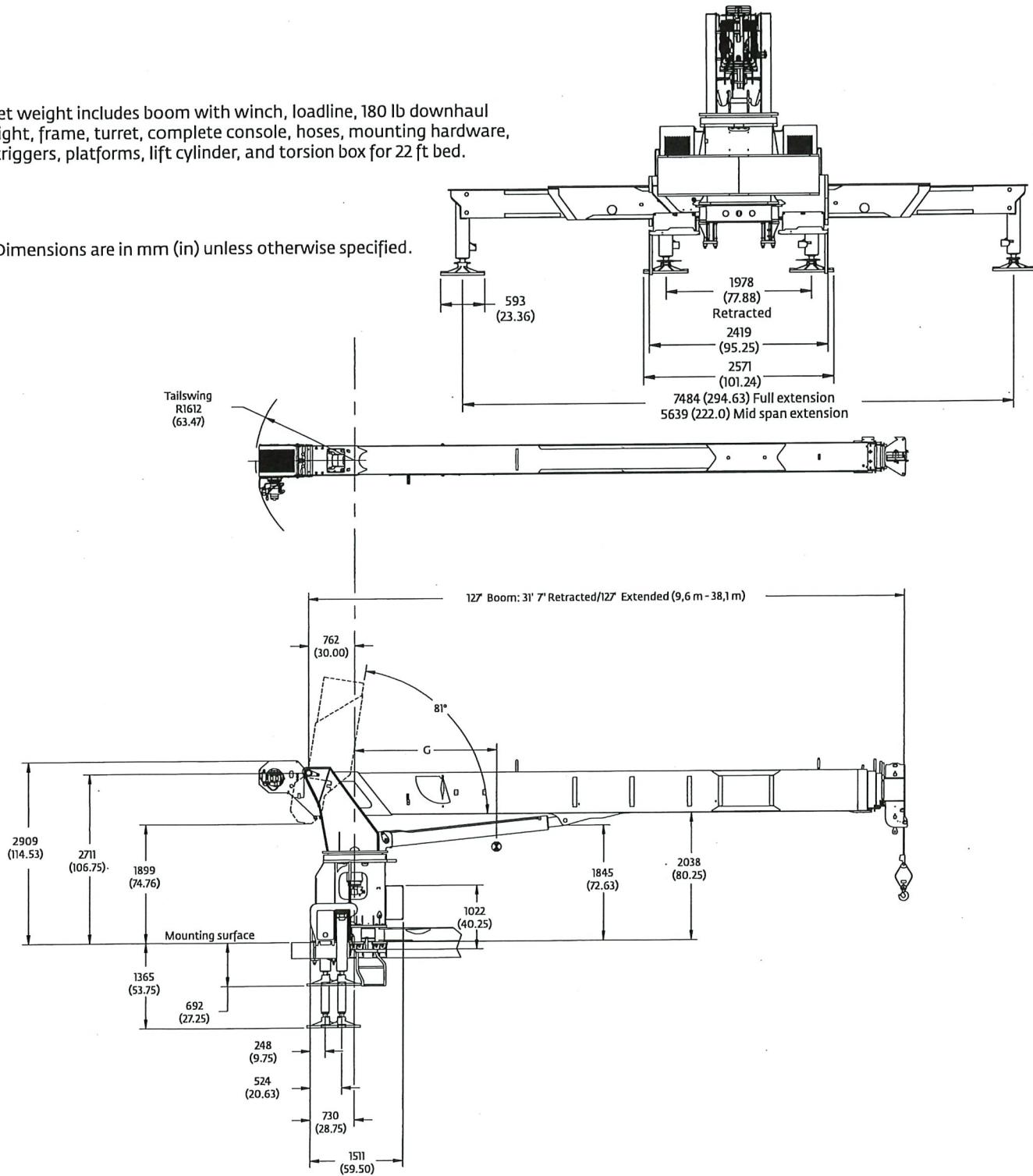
The individual crane's load chart, operating instructions and other instructional plates must be read and understood prior to operating the crane.

Dimensions

	Retracted	Extended	G	wet/wt*
Series	Length	Length	cm (in)	kg (lb)
14127H	31 ft 7 in	127 ft	230 (90.4)	12 869 (28,371)

*Wet weight includes boom with winch, loadline, 180 lb downhaul weight, frame, turret, complete console, hoses, mounting hardware, outriggers, platforms, lift cylinder, and torsion box for 22 ft bed.

Dimensions are in mm (in) unless otherwise specified.



Accessories

Radio Remote Controls –

Eliminate the handling and maintenance concerns that accompany cabled remotes. Operate to a range of about 76 m (250 ft), varying with conditions.

- NB4R

Heavy-duty Personnel Basket –

One and two-person baskets for main boom and jib are available.

- BSA-1
- BSA-R1 (provides rotation)
- BSAY-2

Spanish-Language Danger Decals, Control Knobs, and Operators' Manuals

- SDD
- SOM



Manitowoc Cranes

Regional headquarters

Americas

Manitowoc, Wisconsin, USA
Tel: +1 920 684 4410

Shady Grove, Pennsylvania, USA
Tel: +1 717 597 8121

Europe, Middle East, Africa

Dardilly, France - TOWERS
Tel: +33 (0)4 72 18 20 20

Wilhelmshaven, Germany - MOBILE
Tel: +49 (0) 4421 294 0

China

Shanghai, China
Tel: +86 21 6457 0066

Middle East and Greater Asia-Pacific

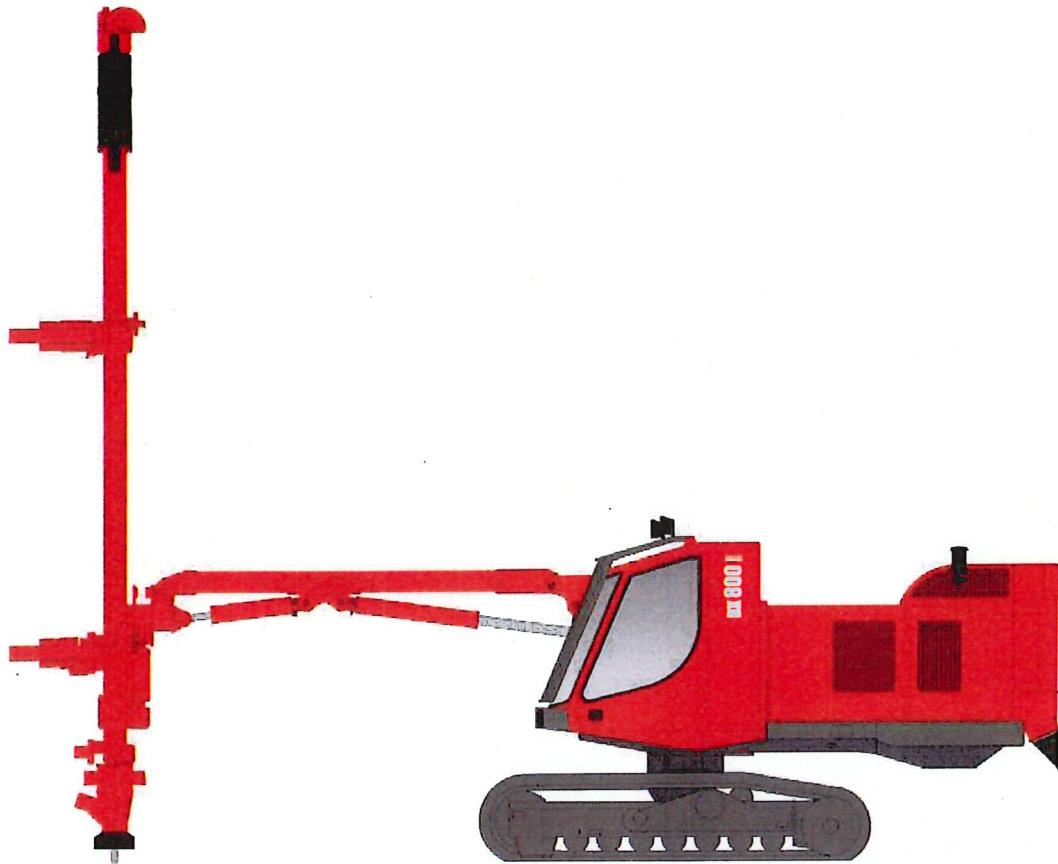
Singapore
Tel: +65 6264 1188

Dubai, UAE
Tel: +9714 8862677



This document is non-contractual. Constant improvement and engineering progress make it necessary that we reserve the right to make specification, equipment, and price changes without notice. Illustrations shown may include optional equipment and accessories and may not include all standard equipment.

www.manitowoc.com



APPLICATION

Sandvik DX800 is a hydraulic, self-propelled, self-contained, crawler based surface drilling rig equipped with a cabin (F.O.P.S. and R.O.P.S.) and rod handling system. It drills vertical, inclined or horizontal holes with a diameter of 64 - 127 mm (2 1/2" - 5") utilizing 38, 45 or 51 mm (1 1/2", 1 3/4" or 2") extension rods.

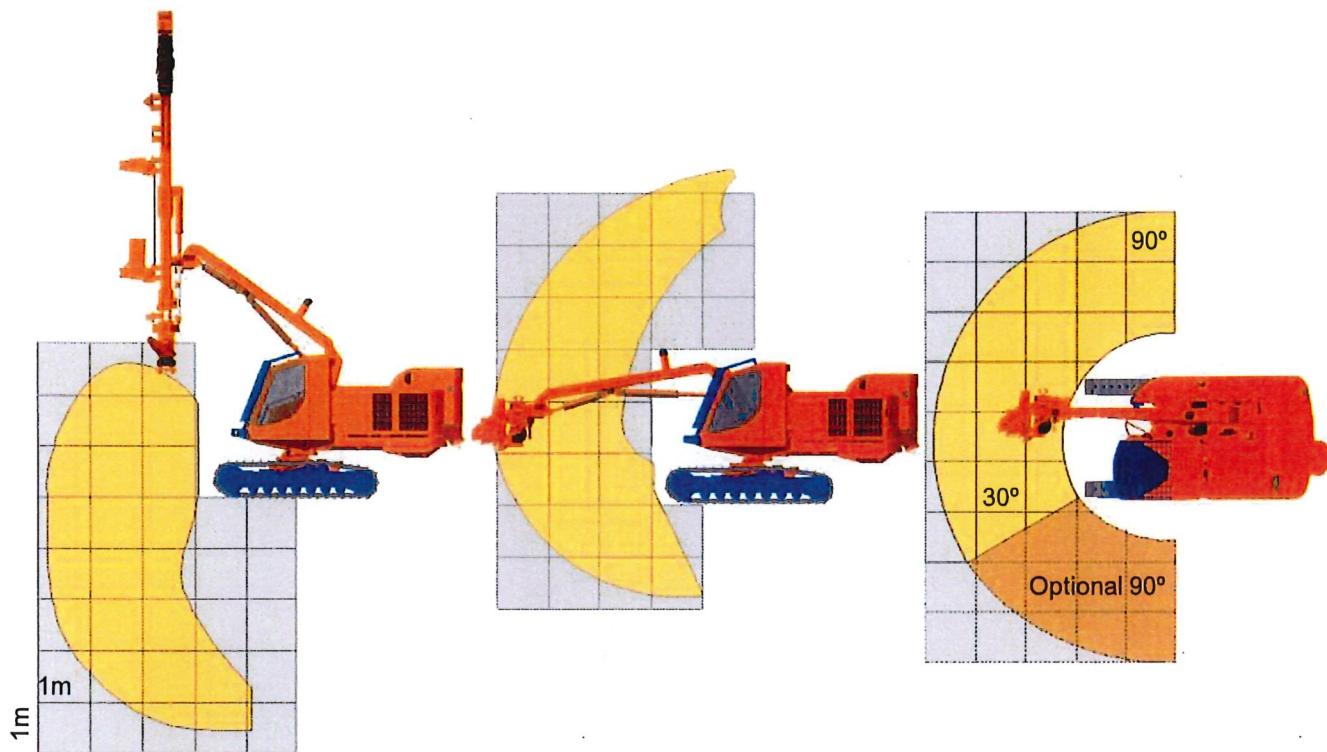
DX800 is equipped with HL 800 T, hydraulic top hammer rock drill. With high rotation torque, sufficient flushing and sophisticated ergonomic drilling control system the rig is well suited also in very fractured rock conditions. The rock drill and articulated boom are mounted on the turnable superstructure giving a drilling coverage of 17,6 m² (optionally 26,4 m²).

The powerpack of DX800 consists of a Caterpillar diesel engine and a gearbox, which divides the power for hydraulic pumps and flushing air compressor. The powerpack is mounted crosswise at the rear end of the superstructure to keep counterweight on the opposite side of the boom and feed regardless of the drilling direction.

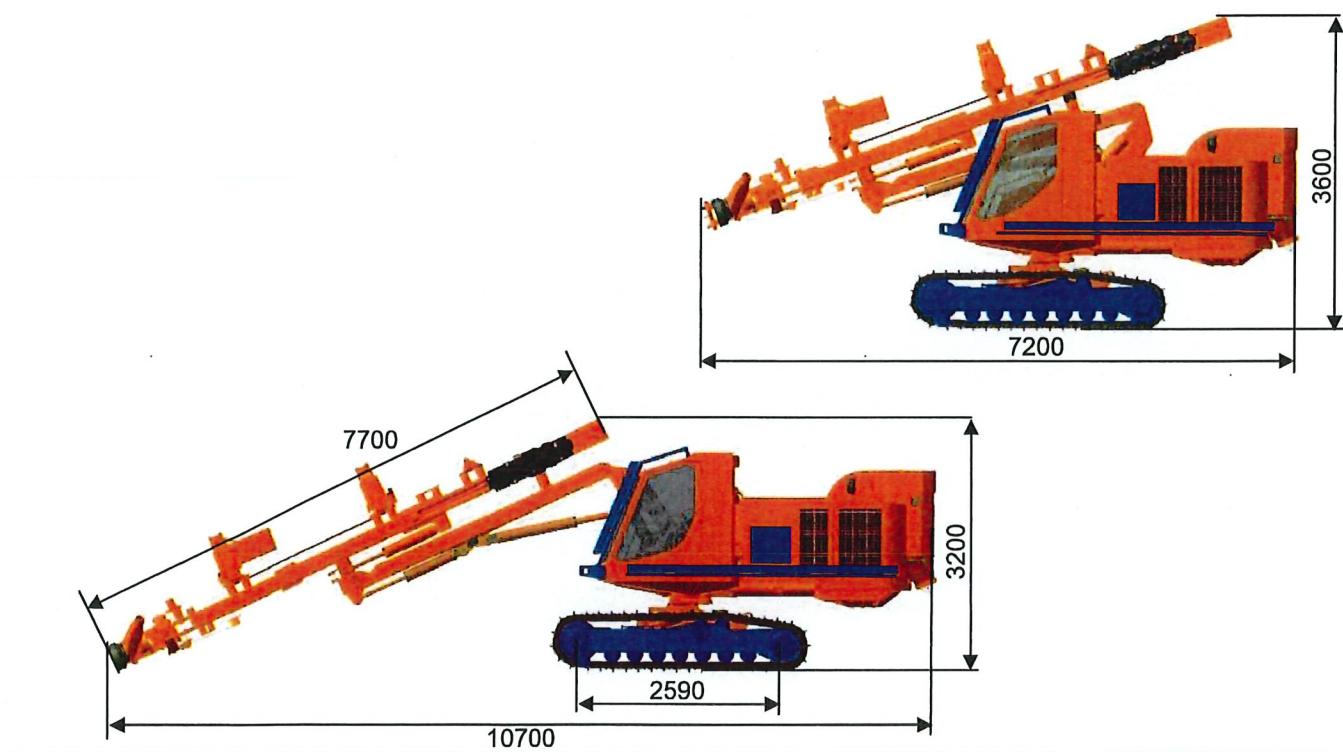
DX800 has an ergonomic cabin to increase operator's safety and visibility. The cabin is certified for R.O.P.S. (ISO-3471 Roll-Over protection Structure) and F.O.P.S. (ISO-3449 Falling Object Protection Structure). Windows are laminated for added safety. The noise level in the cabin is less than 80 dB(A). To keep dust at a minimum, the cabin is fitted with efficient filters for incoming fresh air. Adjustable seat, good visibility, adequate lighting and an optimum working temperature are among the many features ensuring a good operating environment. Drilling functions are proportionally controlled by one hydraulic joy-stick. Several routine functions e.g. antijamming are executed automatically. There are fewer levers to make it easy to use. Driving, rear jack and winch control can be done outside the cabin from the optional remote control box.

Typical applications for DX800 are road cutting, pipeline drilling and foundation drilling, as well as production drilling in medium size quarries. Therefore DX800 is most often used by construction contractors, mines and quarries, and also included in the equipment fleet of rental houses as well.

DRILLING DIMENSIONS



TRANSPORT DIMENSIONS



STANDARD COMPONENTS

1. Rock drill HL 800 T, hydraulic
2. Chain feed CF 145H
3. Rod handler RH 714 incl. 1 set of jaws
4. Boom DB 800H, articulated
5. Carrier Track mounted, turnable superstructure
6. Powerpack Diesel driven, hydraulic pumps and on-board compressor
7. Hydraulic system Load sensing and open center
8. Control system THC 700 Rock Pilot
9. Movable drill steel support
10. Operator's cabin F.O.P.S. and R.O.P.S.
11. Dust collection system DC 800 H, hydraulic
12. Working lights 9 pcs
13. Gauge set For accumulator pressure checking
14. Reversing alarm
15. Manuals Service and spare parts manuals:
2 x paper copy
2 x CD-ROM (Toolman)
16. EU-safety devices

TRANSPORT DIMENSIONS

Weight (without options)	14 900 kg
Width	2.45 m
Height	3.6 m / 3.2 m
Total length	7.2 m / 10.7 m

THE JAWS FOR DRILL STEELS

	Drill steel type	Drill steel diameter	Recommended hole diameter
1.	Extension rods	38 mm 1 1/2"	64 - 70 mm 2 1/2" - 2 3/4"
2.	MF-rod	38 mm 1 1/2"	64 - 70 mm 2 1/2" - 2 3/4"
3.	Extension rods	45 mm 1 3/4"	76 - 89 mm 3" - 3 1/2"
4.	MF-rod	45 mm 1 3/4"	76 - 89 mm 3" - 3 1/2"
5.	MF-rod	51 mm 2"	89 - 127 mm 3 1/2" - 5"
6.	Extension rods	51 mm 2"	89 - 127 mm 3 1/2" - 5"

Note

- not with 10' MF-rods
- with hose reel only 10' or 12' rods
- 51 mm (2") extension rods only 5 + 1
- if several jaws selected please specify jaws assembled

SELECTION OF OPTIONS

1. Turnable superstructure 180°
2. Air conditioning
3. Rod greasing system
4. P&Q electric vertical angle indicator (± 6 deg.)
5. Electric angle indicator TIM 2302 with aiming unit
6. Measuring system TIM 2303 with aiming unit
7. Laser based measuring system TIM 2305
8. Power extractor
9. Electric filling pump for refuelling
10. Remote control box; for rear ground support, driving and oscillation
11. Remote control box + hydraulic winch with cable tightness automatics (replaces and includes previous option)
12. Hydraulic rear ground support
13. Three-bar grouser plates
14. Guides for grousers
15. Towing hook
16. Fuel operated heater for cabin, hydr. oil and engine
17. Flushing control automatics
18. Shut down of suction for water holes
19. Readyness for Power extractor
20. Sanrock Mini H hydraulic bit grinder
21. Primary separator PE 50
22. Horizontal drilling kit (includes hose reel)
23. Hose reel (not with 14' rods)
24. Radio with CD player
25. Central lubrication system
26. Kit for alternative steels
27. Water injection system with tank
28. Water injection system w/o tank
29. Zero Dust system
30. Biodegradeable hydraulic oil, Shell naturelle HFE 46 or HFE 68 (synthetic ester)
31. Extra manuals
32. First service kit for DX800²
33. Special tools for HL 800 T, field kit ID 550 055 29
34. Special tools for HL 800 T, complete ID 550 302 70
35. Antifreeze for air lines
36. Vacuum cleaner for cabin

Sandvik Mining and Construction reserves the right to change this specification without further notice.

Log template to record observations

FIELD PROBING AND GROUTING RECORD



PROJECT: _____ Project No.: _____
 FIELD ENGINEER: _____

STRUCTURE: _____ PROBE NO.: _____

DEPTH	SEC.	OBSERVATIONS			
1			Probing Record		
2			Date of Probing:		
3			Ground Elevation:	ft MSL	
4			Bottom of Footing Elevation:	ft MSL	
5			Grouting Record		
6			Date of Grouting:		
7			Depth of Borehole:	ft	
8			Anticipated Grout Volume:	Cubic Yards	
9			Volume per Stroke:		
10			Number of Strokes:		
11			Actual Grout Volume:	Cubic Yards	
12			Number of Grout Reapplication:		
13			Remarks:		
14		3.5" Dia. Hole	10	FT	
15		Volume	0.6681	Ft ³	
16			0.0247	Yd ³	
17			4.8883	Gallons	
18					
19					
20					

High Priority

CONTRACTOR SUBMITTAL TRANSMITTAL FORM REV. A

Owner: County of Hawaii
Contractor: Nan, Inc.
Project Name: Hilo WWTP Phase 1
Submittal Title:
TO:
From: Nan Inc.

Project No.: WW-4705R
Submittal Number:
For Information Only

Specification No. and Subject of Submittal / Equipment Supplier	
Spec:	Paragraph:
Authored By:	Date Submitted:

Submittal Certification	
Check Either (A) or (B):	
<input type="checkbox"/> (A)	We have verified that the equipment or material contained in this submittal meets all the requirements specified in the project manual or shown on the contract drawings with <u>no exceptions</u> .
<input type="checkbox"/> (B)	We have verified that the equipment or material contained in this submittal meets all the requirements specified in the project manual or shown on the contract drawings <u>except</u> for the deviations listed.
Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements.	

General Contractor's Reviewer's Signature:		
Printed Name and Title: In the event, Contractor believes the Submittal response does or will cause a change to the requirements of the Contract, Contractor shall immediately give written notice stating that Contractor considers the response to be a Change Order.		
Firm:	Signature:	Date Returned:

PM/CM Office Use	
Date Received GC to PM/CM:	
Date Received PM/CM to Reviewer:	
Date Received Reviewer to PM/CM:	
Date Sent PM/CM to GC:	

Nan, Inc

PROJECT: HILO WWTP REHABILITATION
AND REPLACEMENT PROJECT - PHASE 1

JOB NO. WW-4705R

THIS SUBMITTAL HAS BEEN CHECKED BY
THIS CONTRACTOR. IT IS CERTIFIED
CORRECT, COMPLETE, AND IN
COMPLIANCE WITH CONTRACT
DRAWINGS AND SPECIFICATIONS. ALL
AFFECTED CONTRACTORS AND
SUPPLIERS ARE AWARE OF, AND WILL
INTEGRATE THIS SUBMITTAL (UPON
APPROVAL) INTO THEIR OWN WORK.

DATE RECEIVED _____
SPECIFICATION SECTION # _____
SPECIFICATION _____
PARAGRAPH _____
DRAWING _____
SUBCONTRACTOR _____
SUPPLIER _____
MANUFACTURER _____

CERTIFIED BY CQCM or Designee : _____

Variance Request form

Hilo Wastewater Treatment Plant Phase 1
Contract No. WW-4705R

VARIANCE

Request Form

Variance Request

**Clearly and Concisely describe the nature of your request by completing the following questions below. By submitting the Variance Request form, Sub-Contractor acknowledges that they understand and accept the limitation of this form and agree that the information provided does not guarantee the approval of the Variance request. The decision to grant or deny a variance is at the sole discretion of the relevant authority or entity responsible for reviewing such requests.*

Specification section 02256 – Foundation Probing and Grouting

1. What are the benefits the variance has to the Government?

n/a

2. What are the positive and negative impacts to the project and Government if the variance is accepted?

No positive or negative impacts

3. Discuss how the variance is “equal to” or “better than” the specification requirement.

Variance along with the supporting documents are attached in the submittal package

4. What is the cost of the product/material that is originally specified?

n/a

Specification Section 02256

SECTION 02256

FOUNDATION PROBING AND GROUTING

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes the minimum requirements for drilling and grouting of foundation subgrade probe holes. The work includes mobilizing equipment for drilling and grouting; developing suitable drilling methods, grouting procedures, and grout mixing parameters; furnishing, handling, transporting, storing, mixing and injecting the grouting materials; handling and disposal of drill cuttings, waste water, and waste grout; cleanup of the areas upon completion of the work; and all labor, equipment, materials, and other incidentals to complete this work as specified herein. The work consists of drilling and grouting probe holes at specified locations, to depths specified in the Contract documents, or as directed by the Engineer, below foundations to detect and properly fill subsurface cavities or voids that may be encountered during probing with grout meeting requirements specified herein.
- B. The project's "Geotechnical Data Report, Hilo WWTP Rehabilitation & Replacement Project Phase I," prepared by Yogi Kwong Engineers, LLC, dated April 2024 presents data and information on subsurface conditions. These data represent the subsurface information available; however, variations may exist in the subsurface conditions between the exploratory boring and probe locations. Anticipate potential groundwater seepage and/or perched water flowing into the foundation probe holes.
- C. All work shall be performed in accordance with all City, State, and Federal safety and environmental regulations, permits, and other environmental control requirements specified in the Contract documents for the project.

1.02 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The commercial standards are referred to in the text by their basic designations only. The current requirements of the referenced standards and publications shall apply to this Section.
- B. Abbreviations:
 - 1. API - American Petroleum Institute.
 - 2. ASME - American Society of Mechanical Engineers.
 - 3. ASTM - American Society for Testing and Materials.
- C. Commercial Standards:
 - 1. API RP 13B-1 - Recommended Practice for Field Testing Water-based Drilling Fluids, 4th Edition.
 - 2. ASME B16.3 - Malleable Iron Threaded Fittings, Classes 150 and 300.
 - 3. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded at Seamless.

4. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 5. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 6. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens).
 7. ASTM C150/C150M - Standard Specification for Portland Cement.
 8. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
 9. ASTM C937 - Grout Fluidifier for Preplaced-Aggregate Concrete.
 10. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
- D. Standard Specifications:
1. Standard Specifications for Public Works Construction, City and County of Honolulu, 1986.



1.03 SUBMITTALS

- A. The following submittals listed below shall be submitted no later than sixty (60) calendar days after the Notice to Proceed and at least sixty (60) calendar days prior to mobilization of foundation excavation and related construction equipment, whichever comes first.
- B. Submit the name and qualifications of the Contractor-retained QC Specialist responsible to inspect, observe, and document the following work activities: drilling and cleaning of probe holes; grout preparation; backfilling; and any other related work activities as required throughout construction. Submit sufficient information in writing to demonstrate compliance with the project qualification requirements of Article 1.04 of this Section.
- C. Probe and Grout Work Plan:
 1. Submit a detailed work plan describing the proposed drilling and grouting methods and equipment to be used including at a minimum the following:
 - ✓ a. Drilling and grouting methods and procedures.
 - ✓ b. Description of drilling and grouting equipment, including manufacturer's literature describing capabilities.
 - ✓ c. Log template to be used by the QC Specialist to document grouting of probe holes.
 - d. Name and qualification of the independent testing agency.
 - e. Grout Mix Design(s).
 - ✓ f. Spoil control and disposal, including all necessary precautions to control and prevent discharge of grouting spoils and drill cuttings onto adjacent landscaped areas or properties.
 - ✓ g. Restoration plan.
- D. Reports and Records:
 1. The Contractor's retained QC Specialist shall keep records of drilling and grouting operations, to include at a minimum: Individual logs of each grouted holes, probe depths and probe penetration and withdrawal rate per each foot interval during drilling and grouting, geologic characteristics of drill cuttings

This requirement will be covered in a separate submittal.

Substitution of ASTM C595 Type IL in lieu of C150 Type I/II.

Supporting files are attached starting from pdf page 22.

return, the time of each change of grouting operation, the pressure and rate of pumping, grout mix(es) used onsite for each probe hole, grout returns, volume of grout pumped into each drilled hole, and other data as deemed by the QC Specialist to be necessary. Furnish all records to the Engineer in a report signed and stamped by the Contractor's retained QC specialist who shall certify the successful completion of the foundation drilling and grouting program.

1.04 QUALITY ASSURANCE

- A. QC Specialist shall be a Civil Engineer licensed in the State of Hawaii who has worked on a minimum of 3 successfully completed projects performing inspection of foundation probing and grouting work.
- B. Foundation drilling and grouting activities shall be performed will full-time on-site observation under the supervision of the QC Specialist. The QC Specialist is responsible for ensuring the probe holes be drilled and grouted based on accepted work plans and shop drawings, updating the work plan as construction progresses with additional probe holes as needed, and submitting an updated plan if necessary.
- C. Grout Testing shall be performed by an independent testing agency or laboratory that can certify compliance with requirement of ASTM E329, or as accepted by the Engineer. The laboratory shall demonstrate experience performing the laboratory tests of grout mix(es) required herein.

PART 2 PRODUCTS

2.01 MATERIALS AND MIX DESIGN

- A. Deliver all necessary ingredients for grouting in undamaged, unopened containers bearing manufacturer's original label. Store and handle grout materials in accordance with manufacturer's recommendations and in accordance with Section 03300 - Cast-in-Place Concrete and Section 03600 - Grouting.
- B. Grouting Materials: Provide grout composed of a mixture of Portland cement, water, and sand thoroughly mixed together with fluidifier and/or admixture(s), if necessary, into a uniform and balanced mixture. The grout mix(es) shall have a consistency that is fluid and pumpable. Grouting materials shall be as specified in Section 03300 - Cast-in-Place Concrete, Section 03600 - Grouting, and as specified hereinafter. Provide non-shrink, non-metallic, non-gaseous cement grout with a minimum compressive strength of 1,000 psi at 28 calendar days.
- C. Cement: Portland cement, ASTM C150, Type I or II.
- D. Fluidifier: Fluidifier shall be a compound capable of increasing the flowability of the mixture, by assisting in dispersal of the cement grains and neutralizing the setting shrinkage of the grout. The property and performance of the fluidifier shall meet the requirements specified in ASTM C937.

- E. Admixtures: Admixtures shall meet the requirements specified in ASTM C494. If 2 or more admixtures and/or fluidifier are used, all shall be compatible into a uniform and balanced mixture.
 - F. Water: Potable water shall be used

2.02 EQUIPMENT

- A. Drilling Equipment:
 - 1. Standard drilling equipment of the rotary or percussion type capable of completing the work shall be used to perform the drilling. Use air and/or water for removing cuttings from the probe holes during drilling operations. Supplies shall include all bits, drill rods, tools, casing, piping, pumps, water, and power to accomplish the required drilling. All drilling rigs and pumps shall be equipped with pressure gauges.
 - B. Grouting Equipment:
 - 1. The grouting equipment shall be capable of accepting, mixing, and stirring the grout ingredients and additives into a uniform and balanced grout mixture, and shall also be capable of pumping the grout mixture into the probe holes to the specified depths and to the satisfaction of the Engineer.
 - a. Pipes and Fittings: pipes and fittings required for placing grout and providing drainage shall be furnished, cut, threaded, and fabricated by the Contractor.
 - 1) Pipes: Pipes shall be made of black steel with the specified minimum diameters and used in the locations as indicated on the drawings. The pipes shall conform to ASTM A53/A53M.
 - 2) Fittings: Fittings shall be made of black, malleable iron in conformance with ASME B16.3.
 - C. Recording Equipment:
 - 1. Provide automatic recording equipment with a meter to measure the volume of grout injected into each probe hole. The meter shall be calibrated in cubic feet to the nearest one-tenth of a cubic foot.
 - D. Spare parts and/or tools/equipment shall be available on-site to maintain drilling and grouting equipment in satisfactory operating conditions at all times during execution of the drilling and grouting work. Any probe hole lost or damaged as a result of mechanical failure of equipment; inadequate grout supplies; or improper drilling or grouting procedures shall be replaced and re-grouted with another hole, as approved by the Engineer, at no additional cost to the Owner.

PART 3 EXECUTION

3.01 GENERAL DRILLING AND GROUTING PROCEDURE

- A. Notify the Engineer at least 15 days before beginning foundation probe drilling and grouting.

B. Drilling:

1. At a minimum, drill probe holes where indicated on the contract drawings, plus any additional probe holes as directed by the Engineer. However, base the bid price on the number of probe holes and quantities indicated in the Schedule of Values provided in the Bid Documents. The number of probe holes and quantities indicated in the Schedule of Values were developed from the Foundation Probe Hole Schedule and Foundation Probe Hole Schedule for Additive Alternate No. 1 provided herein. In case of a conflict between the Schedule of Values and the schedules provided herein, base the bid price on the numbers and quantities provided in the Schedule of Values. Probe holes shall be minimum 3 inches in diameter and drilled to the depths below the foundation subgrade elevations specified in the probe hole schedule provided herein and on the contract drawings. Do not drill deeper than the specified "drilled depth below foundation" unless directed by the Engineer.
2. If cavities, voids, and/or very soft or loose zones are detected below where slabs on grade or foundations are to be constructed, additional probe holes shall be drilled to delineate their lateral extents as directed by the Engineer or the onsite designated representative of the Engineer.

Deleted as per Bid Addendum 04		Foundation Probe Hole Schedule		
Building/Facility/ Location	Replacement for this table has been provided as a part of Bid Addendum 04 and is pasted after the next sheet	Drilled Depth Below Foundation (ft) ⁽¹⁾	Number of Probe Holes to Drill ⁽²⁾	Estimated Injected Grout Quantity (10x Theoretical Volume of a Drilled Probe Hole) (CY) ⁽³⁾
Septage Receiving Station		20	24	9
Septage Receiving Station - Concrete Ballast		20	10	4
Headworks		40	78	57
Headworks - Grit Pump Room		40	41	30
Headworks - Loading Bay		20	10	4
Headworks Electrical Building		20	18	7
Sludge Blending		30	29	16
Propane Tank		20	3	2
Headworks Odor Control Facility		30	42	23
Flare		20	12	5
Digester Gas Conditioning System		20	21	8
Digester 1		45	49	41
Digester 2		45	49	41
Digester Control Building 1		35	61	39
Primary Sedimentation Tanks - Stairs		20	6	3

Deleted as per Bid Addendum 04

Deleted as per Bid Addendum 04

Foundation Probe Hole Schedule

Replacement for this table has been provided as a part of Bid Addendum 04 and is pasted after this sheet

**Building/Facility/
Location**

**Drilled Depth
Below
Foundation
(ft)⁽¹⁾**

**Number of
Probe
Holes to
Drill⁽²⁾**

**Estimated Injected
Grout Quantity
(10x Theoretical
Volume of a
Drilled Probe
Hole) (CY)⁽³⁾**

Primary Sedimentation Tanks - Concrete Slab

20

12

5

Solids Handling & SCADA Buildings

40

180

131

Solids Odor Control

30

24

14

Return Flow Pump Station

20

9

4

Primary Facilities - Electrical Equipment Pads

20

14

6

Stand By Generator

20

12

5

Additional Probe Holes included in the Base Bid

40

300

219

Total Sum of the Estimated Grout Quantities

673

Notes:

(1) Depth (in feet) below the footing foundation subgrade elevation.

(2) Refer to Plans for drilled probe hole locations.

(3) Based on 3-inch diameter drilled probe holes. Refer to Article 3.01 Paragraph C.1.d for drilled probe hole diameters larger than 3 inches selected by the Contractor.

Deleted as per Bid Addendum 04

Foundation Probe Hole Schedule for Additive Alternate NO. 1**Building/Facility/
Location**

**Drilled Depth
Below
Foundation (ft)⁽¹⁾**

**Number of Probe
Holes to Drill⁽²⁾**

**Estimated Injected
Grout Quantity (10x
Theoretical Volume
of a Drilled Probe
Hole) (CY)⁽³⁾**

Digester 3

45

49

41

Digester Control Building 2

35

54

35

Additional Probe Holes included in Additive Alternate No. 1

40

50

37

Total Sum of the Estimated Grout Quantities

113

Notes:

(1) Depth (in feet) below the footing foundation subgrade elevation.

(2) Refer to Plans for drilled probe hole locations.

(3) Based on 3-inch diameter drilled probe holes. Refer to Article 3.01 Paragraph C.1.a.5) for drilled probe hole diameters larger than 3 inches selected by the Contractor.

Deleted as per Bid Addendum 08

Replacement for this table has been provided as a part of Bid Addendum 08 and is pasted after the next sheet

5. AMENDED Section 02256 – FOUNDATION PROBING AND GROUTING:

- A. REPLACE the table that follows paragraph 3.01.B.2 titled "Foundation Probe Hole Schedule" in its entirety with the following table:

Foundation Probe Hole Schedule			
Building/Facility/ Location	Drilled Depth Below Foundation (ft)⁽¹⁾	Number of Probe Holes to Drill⁽²⁾	Estimated Injected Grout Quantity (10x Theoretical Volume of a Drilled Probe Hole) (CY)⁽³⁾
Septage Receiving Station	20	24	9
Septage Receiving Station - Concrete Ballast	20	10	4
Headworks	40	78	57
Headworks - Grit Pump Room	40	41	30
Headworks - Loading Bay	20	10	4
Headworks Electrical Building	20	18	7
Sludge Blending	30	29	16
Propane Tank	20	3	2
Headworks Odor Control Facility	30	42	23
Flare	20	12	5
Digester Gas Conditioning System	20	21	8
Digester 1	45	49	41
Digester 2	45	49	41
Digester Control Building 1	35	61	39
Primary Sedimentation Tanks - Stairs	20	6	3
Primary Sedimentation Tanks - Concrete Slab	20	12	5
Solids Handling & SCADA Buildings	40	180	131
Solids Odor Control	30	24	14
Return Flow Pump Station	20	9	4
Primary Facilities - Electrical Equipment Pads	20	14	6
Stand By Generator	20	12	5
3W Pump Station	20	4	2
North Drainage Pump Station	30	7	4

New Table for foundation probe hole schedule has been added as part of bid addendum 04.

Foundation Probe Hole Schedule			
Building/Facility/ Location	Drilled Depth Below Foundation (ft) ⁽¹⁾	Number of Probe Holes to Drill ⁽²⁾	Estimated Injected Grout Quantity (10x Theoretical Volume of a Drilled Probe Hole) (CY) ⁽³⁾
Additional Probe Holes included in the Base Bid	40	300	219
Total Sum of the Estimated Grout Quantities			679

Notes:

(1) Depth (in feet) below the footing foundation subgrade elevation.
(2) Refer to Plans for drilled probe hole locations.
(3) Based on 3-inch diameter drilled probe holes. Refer to Article 3.01 Paragraph C.1.d for drilled probe hole diameters larger than 3 inches selected by the Contractor.

Deleted as per Bid Addendum 08

Replacement for this table has been provided as a part of Bid
Addendum 08 and is pasted after the next sheet

New Table for foundation probe hole schedule has been added as part of bid addendum 08.

11. **AMENDED** Section 02256 – FOUNDATION PROBING AND GROUTING:

- A. **REPLACE** the table that follows paragraph 3.01.B.2 titled "Foundation Probe Hole Schedule" in its entirety with the following table:

Foundation Probe Hole Schedule			
Building/Facility/ Location	Drilled Depth Below Foundation (ft)⁽¹⁾	Number of Probe Holes to Drill⁽²⁾	Estimated Injected Grout Quantity (10x Theoretical Volume of a Drilled Probe Hole) (CY)⁽³⁾
Septage Receiving Station	20	24	9
Septage Receiving Station - Concrete Ballast	20	10	4
Headworks	40	78	57
Headworks - Grit Pump Room	40	41	30
Headworks - Loading Bay	20	10	4
Headworks Electrical Building	20	18	7
Sludge Blending	30	29	16
Propane Tank	20	3	2
Headworks Odor Control Facility	30	42	23
Flare	20	12	5

**New Table for foundation probe hole schedule
has been added as part of bid addendum 08.**

Foundation Probe Hole Schedule			
Building/Facility/ Location	Drilled Depth Below Foundation (ft)⁽¹⁾	Number of Probe Holes to Drill⁽²⁾	Estimated Injected Grout Quantity (10x Theoretical Volume of a Drilled Probe Hole) (CY)⁽³⁾
Digester Gas Conditioning System	20	21	8
Digester 1	45	49	41
Digester 2	45	49	41
Digester Control Building 1	35	61	39
Primary Sedimentation Tanks - Stairs	20	6	3
Primary Sedimentation Tanks - Concrete Slab	20	12	5
Solids Handling & SCADA Buildings	40	180	131
Solids Odor Control	30	24	14
Return Flow Pump Station	20	9	4
Primary Facilities - Electrical Equipment Pads	20	14	6
Stand By Generator	20	12	5
3W Pump Station	20	4	2
North Drainage Pump Station	30	7	4
Dumpster Concrete Loading Pad	30	20	11
Warehouse Building	20	64	23
Additional Probe Holes included in the Base Bid	40	350	255
Total Sum of the Estimated Grout Quantities			749

Notes:

- (1) Depth (in feet) below the footing foundation subgrade elevation.
- (2) Refer to Plans for drilled probe hole locations.
- (3) Based on 3-inch diameter drilled probe holes. Refer to Article 3.01 Paragraph C.1.d for drilled probe hole diameters larger than 3 inches selected by the Contractor.

C. Grouting:

1. All grouting operations shall be performed under the supervision of the Contractor's retained QC Specialist and in the presence of the Engineer or an onsite designated representative of the Engineer. The Contractor shall notify the Engineer at least 1 week prior to starting or resuming probing and grouting at each site.
 - a. Grouting Injection:
 - 1) Grout each probe hole through a minimum 1.5-inch or suitable larger diameter pipe inserted to the bottom of the probe hole.
 - 2) At a minimum, the volume of grout to be pumped successively into each probe hole shall be equal to at least the theoretical volume of the probe hole.
 - 3) The grouting of any probe hole shall not be considered complete until that hole refuses to take any more grout with grout overflowing top of the hole.
 - 4) Grout used during the drilling procedure for lubrication shall not be counted toward the volume of grout injected into the probe hole. Grout used to fill the probe hole shall be monitored after reaching the specified depth below foundation.
 - 5) Grout quantities that are injected due to the difference in size between a 3-inch diameter probe hole and a larger diameter probe hole drilled by the Contractor will not be considered as part of the measured grout for payment.
 - 6) If it is found impracticable to complete grouting after pumping up to 1 cubic yard, pumping shall be stopped temporarily and, as directed by the Engineer or the onsite designated representative of the Engineer, intermittent grouting shall be performed into the hole, allowing sufficient time between grout injections for the grout to stiffen. If the desired result is not obtained, grouting shall be discontinued at the probe hole when directed. In such an event, the hole shall be cleaned, the grout allowed to set, and additional probing of minimum 3-inch diameter probe hole and grouting shall then be performed in the partially grouted holes or in the adjacent areas as directed, until the desired grout intake at each hole is achieved, to the satisfaction of the Engineer.
 - 7) Grout that cannot be placed, for any reason, into a probe hole within 2 hours after mixing, or a shorter time as specified by the grout manufacturer, shall be properly disposed of and is not considered as part of the measured grout for payment.
 - b. Equipment Capability and Operation:
 - 1) The grouting equipment and system shall be capable of providing a continuous circulation of grout throughout the system and permitting accurate pressure control by operation of a valve on the grout return line, regardless of how small the grout intake may be. The equipment and lines shall be prevented from becoming fouled by constant circulation of grout and periodic flushing out of the system with water. Flushing shall be done with the grout intake valve closed, the water supply valve opened, and the pump running at full speed.
 - c. When authorized by the Engineer, the Contractor shall backfill encountered cavities and/or voids as directed by the Engineer or the onsite designated representative of the Engineer. The Contractor shall

perform the work in accordance with accepted submittals. The Contractor shall provide all necessary labor, equipment, and materials to fill the encountered cavities and/or voids. Excavations or boreholes shall be supported with suitable shoring provisions to avoid loss of ground and ground movements that could damage adjacent utilities, structures, or improvements, in accordance with Section 02300 - Earthwork. Backfill materials to fill cavities and/or voids, when authorized by the Engineer, shall consist of self-compacting sands and/or gravels, controlled low strength material (CLSM), and/or concrete. Any damage caused by excavation and backfill to fill cavities and/or voids shall be immediately repaired at no additional cost to the Owner.

D. Protection of Work and Cleanup:

1. The Contractor shall furnish pumps and other equipment necessary to handle and properly dispose of drill spoils, and waste grout from all drilling, grouting, and related operations. Upon completion of these operations, clean up all wastes resulting from the operations that are unsightly or would interfere with foundation or other construction. Discharge of all wastes shall be performed in accordance with all applicable government requirements.
2. Roadways shall be cleaned by the Contractor as required to prevent excessive dusting or dirt accumulation, at a minimum, on a daily basis. Vehicles shall be washed prior to exiting the project site and the disposal or stockpiling sites and entering public roadways, as required. The Contractor is responsible to immediately contain and remove all washing or cleaning water from the sites, and discharge or dispose of them properly in accordance with all applicable government requirements.

E. Communications:

1. When, for its own convenience, the Contractor has the individual elements of the plant so located that communication by normal voice between these elements is not satisfactory, the Engineer may require the Contractor to provide a satisfactory means of communications, such as a mobile telephone or other suitable device, at no additional cost to the Owner.

3.02 QUALITY CONTROL

- A. All quality control (QC) testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Owner.
- B. Grout Mix:
 1. During the execution of the foundation probing and grouting, the unit weight or specific gravity shall be measured on liquid samples of grout taken from the grout return line, to verify grout mix uniformity.
 2. Testing shall be performed in accordance with API RP 13B-1 test method. Testing frequency shall be at least 1 test for every two (2) hours that grout is mixed and pumped. Complete and accurate records shall be kept to verify that grout mix is as accepted.

C. Grout Samples:

1. For every 10 probe holes, 2 sets of 4 samples (8 samples total) of the cement grout used for grouting the probe holes shall be collected and fabricated in accordance with ASTM C31/C31M or C109/C109M.
2. Each of these samples shall be stored in a damp environment at constant temperature in accordance with applicable ASTM procedures.
3. After the samples have cured sufficiently, they shall be taken to an independent qualified laboratory, accepted by the Engineer, for testing.
4. Two grout samples shall be subjected to compressive strength tests at 7 days in accordance with ASTM C39/C39M or C109/C109M. The remaining samples shall be subjected to compressive strength test at 28 days following the same ASTM testing procedures.

3.03 MEASUREMENT AND PAYMENT

- A. The project Contract Price shall be adjusted based on the variance in total length of drilled probe holes (i.e. actual total length of drilled probe holes minus the total length of drilled probe holes listed in the Schedule of Values) and the Contractor's unit price listed for this item at bid time in the Schedule of Values.
 1. Adjustment in the Contract Price shall be in accordance with the 1972 General Requirements and Covenants (GRC), Section 4.2-Changes, Article (a)- Increased or Decreased Quantities, Item 1-Unit Price Work and the Special Provisions.
- B. The project Contract Price shall be adjusted based on the variance in grout volume (i.e. actual permissible measured grout volume injected in the probe holes minus the total grout volume listed in the Schedule of Values) and the Contractor's unit price listed for this item at bid time in the Schedule of Values.
 1. Adjustment in the Contract Price shall be in accordance with the 1972 General Requirements and Covenants (GRC), Section 4.2-Changes, Article (a)- Increased or Decreased Quantities, Item 1-Unit Price Work and the Special Provisions.
- C. Payment for additional excavation and backfill to fill cavities and/or voids, directed by the Engineer or the onsite designated representative of the Engineer as specified in Article 3.01 Paragraph C.1.c, including all standby and direct costs related to drilling, excavations, fill, compaction, labor, materials, equipment, and all other incidentals, shall be paid from the allowance for other cavity and/or void backfill as described in Section 01210 - Allowances.

END OF SECTION

Grout Mix Design

ISEMOTO CONTRACTING CO., LTD.
74-5039B Queen Kaahumanu Hwy.
Kailua-Kona, HI 96740

LETTER OF TRANSMITTAL

TO: Nan, Inc.
161 Silva Street
Hilo, HI 96720
Attention: Mr. Brandon Farrell

Date: 6/20/2025 **ICC Job No:** 50615
Job Name: Hilo WWTP Rehabilitation &
Replacement Project Phase 1

WE ARE SENDING YOU **ATTACHED** **UNDER SEPARATE COVER VIA** _____

<input type="checkbox"/> CONTRACT	<input type="checkbox"/> PAYMENT REQUEST
<input type="checkbox"/> CHANGE ORDER	<input type="checkbox"/> CERTIFIED PAYROLL
<input type="checkbox"/> QUOTATION	<input type="checkbox"/> PROPOSAL
<input type="checkbox"/> PURCHASE ORDER	<input type="checkbox"/> COPY OF LETTER
<input type="checkbox"/> WORK ORDER	<input type="checkbox"/> PHOTOGRAPHS
<input type="checkbox"/> OTHER _____	

<input checked="" type="checkbox"/> SUBMITTALS
<input type="checkbox"/> SHOP DRAWINGS
<input type="checkbox"/> SAMPLES
<input type="checkbox"/> PLANS
<input type="checkbox"/> SPECIFICATIONS

QUANTITY	DATE	NO.	DESCRIPTION
1		1	2000 Psi Grout (Jas. W. Glover, Ltd.)

THESE ARE TRANSMITTED AS CHECKED BELOW

<input checked="" type="checkbox"/> FOR APPROVAL
<input type="checkbox"/> FOR YOUR USE
<input type="checkbox"/> AS REQUESTED
<input type="checkbox"/> FOR REVIEW AND COMMENT
<input type="checkbox"/> FOR BIDS DUE ON _____

<input type="checkbox"/> APPROVED AS SUBMITTED
<input type="checkbox"/> APPROVED AS NOTED
<input type="checkbox"/> RETURNED FOR CORRECTIONS
<input type="checkbox"/> RESUBMIT _____ COPIES FOR APPROVAL
<input type="checkbox"/> RETURNING _____ SETS OF PRINTS

<input type="checkbox"/> FOR YOUR INFORMATION
<input type="checkbox"/> REQUEST FOR _____
<input type="checkbox"/> SUBMIT _____ COPIES FOR DISTRIBUTION
<input type="checkbox"/> RETURN _____ CORRECTED PRINTS
<input type="checkbox"/> OTHER _____

REMARKS:

COPIES TO: Mr. Nishant More

SIGNED: Scot S. Yoshimura

Scot S. Yoshimura
Project Manager

Phone: (808) 329-8051

Fax: (808) 329-3261



JAS. W. GLOVER, LTD
HILO, HAWAII
TESTING LABORATORY

MIX DESIGN FOR PORTLAND CEMENT CONCRETE

DATE: 6/20/25

TO: Isemoto Contracting

FROM: JAS W. GLOVER, LTD.

PROJECT: Hilo WWTP Rehabilitation and Replacement Project Phase 1

PROJECT NO.: [REDACTED]

CLASS: Fine Grout 2000 psi

Concrete will be supplied by:
Jas. W. Glover, LTD.

MIX NUMBER: HFG20A

DESIGN WEIGHTS PER CUBIC YARD

MATERIAL	CEMENT	SCM/DRY	FINE AGG			COARSE AGG			WATER		
			TYPE 1L	NONE	#4 SAND	FINE SAND	3C(#57)	3F(#67)	#8 CHIP	H ₂ O	AIR%
SOURCE:	HAWAIIAN	FIBERS	GLOVER	GLOVER	GLOVER	GLOVER	GLOVER	GLOVER	COUNTY	AIR%	ADMIX
SSD WTS LBS.	470	0.0	0	3044	0	0	0	0	392		1.5
SPEC. GRAVITY	3.14	0.000	2.817	2.810	2.800	2.810	2.839	2.839	1		
ABSOLUTE VOL.	2.4	0.00	0.00	17.36	0.00	0.00	0.00	0.00	6.27	0.95	0.02
% MOISTURE			3.40	3.20	2.40	1.90	1.80	1.80			
% ABSORPTION			3.40	3.20	2.40	1.90	1.80	1.80			
CORRECTION %			0.00	0.00	0.00	0.00	0.00	0.00			
CORRECTION LB.			0	0	0	0	0	0	0		
BATCH WTS LB.	470	0	0	3044	0	0	0	0	392	0	2
											3907

Slump (in.):

8"- 10"

Air (%):

3.5%

Unit Wt.(lbs./ft³):

144.70

W/C Ratio (lb/lb):

0.83

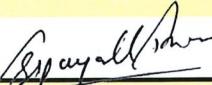
H₂O (Gal.):

47.0

ADMIXTURE TYPE	RETARDER	MID-RANGE	HRWR	STABILIZER	VMA	AIR	SRA	CORROSION INHIBITOR	OTHER
ADMIXTURE NAME	DELVO	POZ 322	GLENIUM	Z-60	VMAR-3	DAREX	SRA-35	MCI2005	DCI-S
LOW OZ/CWT:	1.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADMIX OZ / YD3:	4.7	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HIGH OZ/CWT:	1.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADMIX OZ / YD3:	4.7	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPEC. GRAV.	1.08	1.21	1.05	1.04	1.02	1.04	#N/A	0.99	1.20
ABS. VOL.:	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00

REMARKS: 1) PLEASE REFER TO MIX NUMBER WHEN ORDERING THIS MIX.

SUBMITTED BY:


Jayanth Kumar Rayapetti Kumar, PE

Quality Control Engineer

By:

Prime Contractor

MIX DESIGN SUBJECT TO MODIFICATION TO MAINTAIN YIELD, STRENGTH, WORKABILITY, AND/ OR SETTING TIME.

Aggregate Qualification

Item	Test Method	#57	#67	#8	#4 Fine	Fine Sand
1	Sieve Analysis, C136, C117					
	2-1/2"					
	2"					
	1-1/2"	100	100	100	100	100
	1"	100	100	100	100	100
	3/4"	89	100	100	100	100
	1/2"	41	63	100	100	100
	3/8"	16	31	98	100	100
	#4	7	8	22	100	100
	#8	3	4	7	74	81
	#16	2	2	2	49	59
	#30	1	1	1	33	39
	#50	1	1	1	23	27
	#100	1	1	1	19	20
	#200	0.1	0.5	0.7	12.5	15.0
2	Fineness Modulus				3.0	2.7
	Sand Equivalent, T176, C2419				85	79
	Specific Gravity C127, C128					
	3a SSD Specific Gravity	2.800	2.810	2.839	2.817	2.810
	3b Absorption, %	2.4	1.9	1.8	3.4	3.2
	4 LA Abrasion % C131	26.8	27.2	27.8		
	5 Fractured Faces %	100	100	100		
	6 Liquid Limit D4318				0	0
	7 Plasticity				Non-Plastic	Non-Plastic
	8 Soundness Loss %, C88	1.2	1.4	1.9	3.8	3.6
9	Organic Impurities, C40				None	None
	10 Clay Lumps and Friable Particles, C142	0.3	0.5	0.7	0.2	0.3



**PORLTAND LIMESTONE CEMENT CONFORMING TO
ASTM C595/C595M-21 TYPE IL, SCG Bangkok Thailand**

Physical properties	Unit	Specification	Test Results	Test Method
Air content of mortar	%	12 Max	9.2	ASTM C 185
Autoclave expansion	%	0.80 Max	0.03	ASTM C151/C151M
Blaine	cm ² /g	A	4430	ASTM C 204
Mass density	g/cm ³	A	3.14	ASTM C 188
Heat of Hydration	J/g(cal/g)	**	301	ASTM C1702
Mortar Bar Expansion *	%	< 0.020	0.004	ASTM C1038
Sulfate Resistance	%	0.10 Max ***	0.07	ASTM C1012
Compressive Strength				
3 days	PSI/MPa	1890 (13.0)	5670 (39.1)	ASTM C 109/C109M
7 days		2900 (20.0)	6360 (43.8)	
28 days		3620 (25.0)	7480 (51.5)	
Time of setting (Vicat)				
Initial set	Minutes	45 Min	110	ASTM C 191
Final set		420 Max	200	
Retained content on				
.+Sieve 45µm	%	10.0 Max	0.75	ASTM C 430
Chemical properties				
MgO	%	A	1.1	ASTM C114
SO ₃	%	3.0 Max*	2.6	
Loss on ignition (LOI)	%	10 Max	4.78	
Insoluble Residue	%	A	Mill Cert-0.27	
Limestone in cement	%	5.0-15.0	8.47	
CaCO ₂ in Limestone	%	70 or >	94.11	
SiO ₂	%	A	19.0	
Al ₂ O ₃	%	A	4.1	
Fe ₂ O ₃	%	A	2.9	
CaO	%	A	64.7	
K ₂ O	%	A	0.44	
Na ₂ O	%	A	0.14	
R ₂ O (Total alkalies)	%	A	0.43	
Chloride content	%	A	0.04	

Remark:

April 22, 2025

This cement meets ASTM C595 and AASHTO M240 Specification
for Type IL Portland Limestone Cement.

Daniel K. Paaaina III

Chemist

A = Not applicable.

* = Default table maximum may be exceeded if C1038/C1038M limit is met.

** = Meets 3d Moderate Heat - MH

***=Meets 180d Moderate Sulfate - MS



Cement Division

MEMO

Date: April 5, 2023

To: Hawaiian Cement Customers

From: Darren Orr

Subject: Type 1L Cement Update

Hawaiian Cement is committed to providing a quality and consistent cement product to the State of Hawaii as we do our part to meet the cement industry's NetZero CO2 emissions goal by 2050. To do this, we have tested Type 1L cement from several suppliers over multiple samples to validate quality and consistency. We have also personally visited each cement plant under consideration to ensure the plant adheres to quality, consistency, environmental and safety standards.

Additionally, Hawaiian Cement must consider other factors when deciding on a supplier including customer testing feedback, costs, ship type availability, and contract flexibility. Each plant must also meet the logistical demands we impose on them as a supplier.

Although we have not made the final supplier selection, our intent is to begin transitioning over to Type 1L cement as early as October- November 2023, but no later than the end of the first quarter of 2024. During this transition, it is our goal to limit the impact on customers.

We will continue to update you on this transition. Please feel free to contact our Cement Sales Department for any questions you may have.

Portland-Limestone Cement

U.S. Fact Sheet

A lower carbon cement that has already reduced CO₂ emissions in the U.S. by more than 325,000 metric tons is available now, which is equivalent to the carbon stored in over 400,000 acres of forest for a year. And that's just the beginning.

Portland-limestone cement, or PLC, is engineered with a higher limestone content than portland cement to reduce the carbon footprint of concrete by about 10%. It performs just like the cement you're used to using, resulting in the same concrete you're used to having. The same specifications, the same mix design, now with a better carbon profile.

Concrete is everywhere. In fact, other than water, it's the most-used material on the planet, representing about 50% of all manmade materials (by mass). It's a versatile, economical construction material that is the basis for everything we build. Foundations. Buildings. Roads. Water and waste storage and delivery structures. Modern society is possible thanks to the versatility and widespread availability of concrete.

Because society places so much concrete each year, even small changes to its formulation can have dramatic effects on the construction industry's annual carbon footprint. Modifying a concrete mix design to replace higher carbon materials with lower carbon ingredients is an effective strategy. Portland-limestone cement offers an easy way for concrete producers to accomplish this, much like fly ash and slag cement have done for decades. And concrete mixes designed with PLCs are compatible with all supplementary cementing materials (SCMs), so when you substitute PLC for ordinary portland cement, you can continue to use all the other materials you use to make concrete for an even greater reduction in carbon footprint.

Applications and Uses

Almost anywhere you use ordinary portland cement, you can use PLC instead. In the U.S., PLCs have an established track record for transportation infrastructure. Many states have been placing PLC concrete pavements for more than a decade – with good results. From highways to driveways, PLC performs just as well in heavy-duty pavements as it does for residential flatwork. And it's appropriate for bridge applications, too, from top to bottom, everything from the deck down to the foundation, even including geotechnical work. For buildings, PLC concrete is a natural fit for structural members of any type or size, and it's also great for exterior finishes and hardscaping. Architects and other designers who are tasked with meeting goals put forth by green rating systems or codes will find PLC an especially useful approach to help them achieve a lower carbon footprint for any project.

Easy to Use at a 1:1 Cement Replacement

To help with the transition to more environmentally friendly concrete, cement manufacturers understand that the switch to PLC must be simple. By optimizing PLCs, they have made it easy for specifiers, producers, and installers to use them. PLC can be swapped in for portland cement at a 1:1 replacement level. This is a big help to ready mix producers, who can continue operations using their well-established systems with a minimal amount of disruption.

In most cases, all that is needed for maintaining fresh concrete behavior is typical tweaking of proportions or admixtures, similar to changing from one source of cement to another. Anyone who knows how to work with cement and concrete knows how to work with PLC concrete.

Extensively Tested for Similar Production, Handling, and Durability

Portland-limestone cement and concrete mixes containing PLC have been used around the world for decades. However, PLC has also been subjected to extensive research and testing by industry, both in the U.S. and elsewhere. Researchers have studied fresh properties related to placing and finishing, as well as hardened properties that relate to durability.

As noted, cement producers optimize PLC products so that they perform in the same way as portland cement because that's what their customers expect: fresh properties that enable similar handling and placing characteristics and hardened properties to assure good long-term performance in any type of exposure.

Durability is usually first demonstrated by accelerated laboratory testing and backed up by observation of field performance over time. Areas studied include resistance to scaling and freeze-thaw, chlorides, sulfates, and alkali-silica reaction. Each type of exposure has been thoroughly investigated to confirm that PLC produces strong, durable concrete.

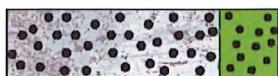
Manufactured with Lower CO2

Cement is made by grinding clinker—the main energy intensive ingredient—to a fine powder. Cement producers know that replacing some of the clinker in portland cement with ground limestone offers benefits, the most important being that it reduces the embodied CO2 of the cement. Whereas the U.S. standard for portland cement allows for up to 5% of clinker to be replaced by limestone, the standard for blended cement allows for 5% to 15% limestone replacement in PLC. Either way, the same clinker is used to make portland cement and portland-limestone cement. There's just less of it in PLC.

Portland cement can contain up to 5% limestone along with the clinker.



Portland-limestone cement can contain from 5% to 15% limestone along with the clinker.



To assure similar performance in concrete, manufacturers optimize PLCs by grinding them a bit finer than portland cement. The limestone particles can pack closer together to tighten the concrete matrix and their finer grind makes them slightly more reactive. And with the particles distributed throughout the mix, they can provide additional “nucleation” sites for chemical reactions to take place. All of this helps control strength development, ultimate strength, and is beneficial to concrete performance in other ways, too, such as helping to reduce permeability.

Adoption in U.S. Building Codes... And More

The cement industry has made great strides with other agencies toward the acceptance of PLC, allowing the U.S. to transition to environmentally friendlier concrete. ACI 318, Building Code Requirements for Structural Concrete, includes PLCs in the same way as portland and other blended cements. Along with code recognition, PLCs were similarly included in ACI 301, Specification for Structural Concrete. In addition to inclusion in ACI standards, PLCs are recognized by the International Code Council, the Federal Aviation Authority, and the American Institute of Architects Master Spec.

Reference standards for ready mixed concrete, ASTM C94, Specification for Ready Mixed Concrete, treat PLCs in the same way as other blended cements that have been used for decades. Cement standards in the U.S. (ASTM C595, AASHTO M 240) and Canada (CSA A3001) have recognized portland-limestone cements for about a decade. And even before that, some manufacturers were producing PLCs under the performance specification for cement (C1157). Though these are innovative, PLCs are not new products.

Doing More to Reduce Carbon Emissions (or GHGs)

By simply specifying PLC instead of ordinary portland cement, you can typically achieve a reduction of about 10% of the CO2 footprint for concrete. (The exact amount depends on each cement manufacturer's formulations.) For the best understanding of your CO2 savings with PLC, ask your cement provider.

Since the 1970s, improvements to U.S. cement manufacturing have resulted in a more than 40% decrease in production energy while also reducing CO2. The innovation of PLC can be viewed as yet another improvement in a long line of developments introduced by the cement industry to lower its energy and carbon footprints: converting wet kilns to dry kilns to reduce the energy for combustion, adding preheaters and precalciners to cement kilns to improve energy efficiency, and using waste for energy to reduce the burden on landfills.

As society looks to the future, cement manufacturers can offer a major contribution on the part of the construction industry to help address global climate change. PLC offers specifiers, architects, engineers and designers a new way to think about concrete while still offering the resilience and sustainability they've come to expect from it. ■



How do I specify PLC?

Specifying PLC for use in concrete is not complicated. PLC is a direct replacement for ordinary portland cement (OPC), so it only requires one change to project specifications: Refer to **ASTM C595 Type IL** instead of ASTM C150 Type I portland cement. **It's that simple.** If the concrete requires special properties, such as sulfate resistance, see “What if my concrete requires special properties?” below.

DOT Construction using AASHTO Specifications

For some state DOT construction, specifications developed by the American Association of State Highway Transportation Officials (AASHTO) are used instead of ASTM. AASHTO M 85 is the specification for portland cements; AASHTO M 240 is specification for blended cements. The technical provisions of AASHTO M 85 and M 240 are the same as those of ASTM C150 and C595 respectively, so switching to PLC just requires reference to an M 240 Type IL cement instead of M 85 Type I. Just as with C150/C595, similar special cement types are available— see “What if my concrete requires special properties?” below.

American Institute of Architects (AIA) MasterSpec

AIA MasterSpec includes PLC as an option under the Blended Hydraulic Cement entry. MasterSpec Section 0330000 on Cast-in-Place Concrete includes the following options in Section 2.5D on Cementitious Materials:

Portland Cement: ASTM C 150/C150M, [Type I] [Type II] [Type I/II]
[Type III] [Type V], [gray] [white]

Blended Hydraulic Cement: ASTM C 595/C595M, [Type IS, portland
blast-furnace slag] [Type IP, portland-pozzolan] [Type IL,
portland-limestone] [Type IT, ternary blended] cement.

Federal Aviation Administration (FAA) Specification

For airport construction, PLC is permitted under FAA Advisory Circular AC 150AC No: 150/5370-10H, Standard Specifications for Construction of Airports. Item P-501, Cement Concrete Pavements, includes the following text with the option to use Type IL cements:

501-2.2 Cement. Cement shall conform to the requirements of ASTM [] Type [].

The Engineer shall specify all of the following that are acceptable for use on the project:

ASTM C150 - Type I, II, or V.

ASTM C595 - Type IP, IS, IL.

ASTM C1157 - Types GU, HS, MH.

Other cements may be specified with concurrence of the FAA.

Canadian Specifications

Canada has two categories for portland-limestone cements, and both are specified under CSA A3000, Cementitious Materials Compendium. This is a bit different than how the U.S. handles PLCs. Under CSA A3000, Type GUL, meaning “General Use-Limestone” is a portland-limestone cement and that standard has another category for portland-limestone *blended* cements, which include SCMs in addition to the ground limestone. These are specified, for example, as Type GULb, with the designation meaning “General Use-Limestone blended” cement. In Canada, for other portland-limestone cements and their blended counterparts that are used for concrete with special properties, refer to the [CSA Group](#).

Testing Requirements and Cement Qualifiers for PLCs and PLC Mixes

If I add PLC to my specifications, is any testing required?

It is recommended that trial batching be performed to confirm expected fresh and hardened performance, just as if a new source of portland cement was being used. Because PLCs are optimized to provide the same type of performance in concrete, your mix designs are likely to remain unchanged. Some minor adjustments may be needed, like dialing in admixture dosages or tweaking aggregate content.

What if my concrete requires special properties?

If special properties such as moderate sulfate resistance are required, a qualifier is added to the IL designation. The table below shows a comparison of OPC vs. PLC to meet special properties for cements specified by either ASTM C150 or C595, or their counterparts from AASHTO, M 85 or M 240.

Cement type	OPC C150 (M 85)	PLC C595 (M 240)
General use	I	IL
moderate sulfate resistance*	II, II(MS)	IL(MS)
moderate heat of hydration	II(MH)	IL(MH)
high sulfate resistance*	V	IL(HS)
low heat of hydration	IV	IL(LH)

*For additional sulfate resistance, SCMs can be used in the concrete mix.

Sulfate resistance. Cements with moderate and high sulfate resistance are only required when exposures warrant that. Although some Type IL cements can meet sulfate resistance requirements without SCMs, in general, the same techniques that protect Type I cement

mixtures against sulfate exposure are used to protect Type IL mixtures: use additional supplementary cementitious materials (SCMs) and low water-to-cementitious materials ratios to improve sulfate resistance. Guidance on this is provided in ACI 318, *Building Code Requirements for Structural Concrete and Commentary*. If there is no sulfate exposure, the (MS) or (HS) designations are not needed.

Heat of hydration (HOH). Moderate and low HOH designations (MH) and (LH) are generally only needed for mass placements, when the concrete member is greater than about a meter (yard) thick. If heat is not rapidly dissipated in massive members, a significant rise in concrete temperature can occur, *potentially* leading to non-uniform cooling of the concrete and creating excessive tensile stresses. Elevated concrete temperatures during curing (more than 70°C (about 158°F)) may also trigger a distress mechanism known as “DEF” (delayed ettringite formation). DEF has been associated with reduced service life for concrete. On the other hand, a rise in concrete temperature caused by HOH is often beneficial in cold weather, if it helps maintain favorable curing temperatures.

Heat of hydration characteristics of OPC and PLC are assessed using the same test (ASTM C1702) and the same limits apply. As cements with special properties may not be routinely produced in all areas, it is recommended that their availability be verified when needed.

Master Builders Solutions Admixtures US, LLC

February 21, 2025

Jas Glover LTD
890 Leilani St
Hilo
HI 96720

Attention: Garrick Campbell

Project: COC

Project location: Hilo

Certificate of Conformance

MasterPozzolith® 322
Master Builders Solutions Admixture

I, Richard Hubbard, Sr. Technical Marketing Specialist for Master Builders Solutions, Cleveland, Ohio, certify:

That MasterPozzolith 322 admixture is a Master Builders Solutions Water-Reducing Admixture for concrete; and

That MasterPozzolith 322 and Pozzolith 322N admixture are the same product having identical composition, differing only in designation; and

That no calcium chloride or chloride based ingredient is used in the manufacture of MasterPozzolith 322 admixture; and

That MasterPozzolith 322 admixture, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00024 percent (2.4 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and

That MasterPozzolith 322 admixture meets the requirements for a Type A, Water Reducing, Type B, Retarding, and Type D, Water Reducing and Retarding Admixture specified in ASTM C494/C494M and AASHTO M194, the Standard Specification for Chemical Admixtures for Concrete, as well as the requirements for Type A, Type B and Type D admixtures as specified in Corps of Engineers' CRD-C 87.



Richard Hubbard
Sr. Technical Specialist

03 30 00	Cast-in-Place Concrete
03 40 00	Precast Concrete
03 70 00	Mass Concrete

MasterPozzolith® 322

Water-Reducing Admixture

Description

MasterPozzolith 322 ready-to-use, liquid admixture is used for making more uniform and predictable quality concrete. It meets ASTM C 494/C 494M requirements for Type A, water-reducing, Type B, retarding, and Type D, retarding and water-reducing, admixtures.

Applications

Recommended for use in:

- Prestressed concrete
- Precast concrete
- Reinforced concrete
- Shotcrete
- Lightweight concrete
- Pumped concrete
- 4x4™ Concrete
- Pervious concrete
- Self-consolidating concrete (SCC)

Features

- Reduced water content required for a given workability
- Normal setting characteristics

Benefits

- Improved workability
- Reduced segregation
- Superior finishing characteristics for flatwork and cast surfaces
- Increased compressive and flexural strengths

Performance Characteristics

Mix Data: 400 lb/yd³ (237 kg/m³) of Type I cement; slump 5 inches (125 mm); non-air-entrained concrete; concrete temperature 76 °F (24 °C); ambient temperature 74 °F (23 °C).

Setting Time

Mix Design	Initial Set (h:min)	Difference (h:min)
Plain Concrete	5:20	REF
MasterPozzolith 322 admixture @		
3 fl oz/cwt (195 mL/100 kg)	5:15	-0:05
5 fl oz/cwt (325 mL/100 kg)	5:40	+0:20
7 fl oz/cwt (460 mL/100 kg)	6:20	+1:00

Compressive Strength

Mix Design	psi	7 Days			28 Days		
		MPa	%	psi	MPa	%	
Plain Concrete	2150	14.8	100	3070	21.2	100	
MasterPozzolith 322 admixture @							
3 fl oz/cwt (195 mL/100 kg)	2820	19.4	131	3970	27.4	129	
5 fl oz/cwt (325 mL/100 kg)	3160	21.8	147	4100	28.3	134	
7 fl oz/cwt (460 mL/100 kg)	3190	22.0	148	4390	30.3	143	

Note: The data shown are based on controlled laboratory tests. Reasonable variations from the results shown here may be experienced as a result of differences in concrete-making materials and jobsite conditions.

Setting time of concrete is influenced by the chemical and physical composition of the basic ingredients of the concrete, the temperature of the concrete and the climactic conditions. Trial mixes should be made with job site materials to determine the dosage required for specified setting time and a given strength requirement.

Guidelines for Use

Dosage: MasterPozzolith 322 admixture is recommended for use within a range of 3-7 fl oz/cwt (195-460 mL/100 kg) of cement for most concrete mixtures using average concrete ingredients. Because of variations in job conditions and concrete materials, dosages other than the recommended amounts may be required. In such cases, contact your local sales representative.

Product Notes

Corrosivity – Non-Chloride, Non-Corrosive: MasterPozzolith 322 admixture will neither initiate nor promote corrosion of reinforcing steel in concrete. This admixture does not contain intentionally-added calcium chloride or other chloride-based ingredients.

Compatibility: MasterPozzolith 322 admixture may be used in combination with any Master Builders Solutions admixtures. When used in conjunction with other admixtures, each admixture must be dispensed separately into the mixture.

Storage and Handling

Storage Temperature: MasterPozzolith 322 admixture should be stored above freezing temperatures. If MasterPozzolith 322 admixture freezes, thaw at temperatures above 35 °F (2 °C) and completely reconstitute by mild mechanical agitation. **Do not use pressurized air for agitation.**

Shelf Life: MasterPozzolith 322 admixture has a minimum shelf life of 18 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your local sales representative regarding suitability for use and dosage recommendations if the shelf life of MasterPozzolith 322 admixture has been exceeded.

Packaging

MasterPozzolith 322 admixture is supplied in 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

Related Documents

Safety Data Sheets: MasterPozzolith 322 admixture

Additional Information

For additional information on MasterPozzolith 322 admixture, contact your local sales representative.

Master Builders Solutions, a brand of MBCC Group, is a global leader of innovative chemistry systems and formulations for construction, maintenance, repair and restoration of structures. The Admixture Systems business provides advanced products, solutions and expertise that improve durability, water resistance, energy efficiency, safety, sustainability and aesthetics of concrete structures, above and below ground, helping customers to achieve reduced operating costs, improved efficiency and enhanced finished products.

Utilizing worldwide resources, the Master Builders Solutions community of experts are passionate about providing solutions to challenges within all stages of construction, as well as the life cycle of a structure. At Master Builders Solutions we create sustainable solutions for construction around the globe.

Limited Warranty Notice

Master Builders Solutions Admixtures US, LLC ("Master Builders Solutions") warrants this product to be free from manufacturing defects and to meet the technical properties on the current Technical Data Guide, if used as directed within shelf life. Satisfactory results depend not only on quality products but also upon many factors beyond our control. **MASTER BUILDERS SOLUTIONS MAKES NO OTHER WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ITS PRODUCTS.** The sole and exclusive remedy of Purchaser for any claim concerning this product, including but not limited to, claims alleging breach of warranty, negligence, strict liability or otherwise, is shipment to purchaser of product equal to the amount of product that fails to meet this warranty or refund of the original purchase price of product that fails to meet this warranty, at the sole option of Master Builders Solutions. Any claims concerning this product must be received in writing within one (1) year from the date of shipment and any claims not presented within that period are waived by Purchaser. **MASTER BUILDERS SOLUTIONS WILL NOT BE RESPONSIBLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFITS) OR PUNITIVE DAMAGES OF ANY KIND.**

Purchaser must determine the suitability of the products for the intended use and assumes all risks and liabilities in connection therewith. This information and all further technical advice are based on Master Builders Solutions' present knowledge and experience. However, Master Builders Solutions assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights, nor shall any legal relationship be created by or arise from the provision of such information and advice. Master Builders Solutions reserves the right to make any changes according to technological progress or further developments. The Purchaser of the Product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with a full application of the product(s). Performance of the product described herein should be verified by testing and carried out by qualified experts.



Master Builders Solutions Admixtures US, LLC

February 21, 2025

Jas Glover LTD
890 Leilani St
Hilo
HI 96720

Attention: Garrick Campbell

Project: COC

Project location: Hilo

Certificate of Conformance

MasterSet® DELVO

Master Builders Solutions Admixture for Concrete

I, Richard Hubbard, Sr. Technical Marketing Specialist for Master Builders Solutions, Cleveland, Ohio, certify:

That MasterSet DELVO admixture is a Master Builders Solutions Hydration Controlling Admixture for concrete; and

That MasterSet DELVO admixture and DELVO Stabilizer admixture are the same product having identical composition, differing only in designation; and

That no calcium chloride or chloride based ingredient is used in the manufacture of MasterSet DELVO admixture and

That MasterSet DELVO admixture, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00014 percent (1.4 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and

That MasterSet DELVO admixture meets the requirements for a Type B, Retarding and Type D, Water-Reducing and Retarding Admixture specified in ASTM C494/C494M, the Standard Specification for Chemical Admixtures for Concrete, as well as the requirements for Tyep B and Type D admixtures as specified in Corps of Engineers' CRD-C 87 and AASHTO M194.



Richard Hubbard
Sr. Technical Specialist

03 30 00	Cast-in-Place Concrete
03 40 00	Precast Concrete
03 70 00	Mass Concrete

MasterSet® DELVO

Hydration Controlling Admixture

Description

MasterSet DELVO ready-to-use, liquid admixture is used for making more uniform and predictable high-performance concrete. MasterSet DELVO admixture retards setting time by controlling the hydration of portland cement and other cementitious materials while facilitating placing and finishing operations. MasterSet DELVO admixture meets ASTM C 494/C 494M requirements for Type B, retarding, and Type D, water-reducing and retarding, admixtures.

Applications

Recommended for use in:

- Stabilization of concrete washwater
- Stabilization of returned plastic concrete
- Stabilization of freshly batched concrete for long hauls
- 4x4™ Concrete
- Pumped concrete, shotcrete (wet mix) and conventionally-placed concrete
- Plain, reinforced, precast, prestressed, lightweight and normal weight concrete
- Pervious concrete

Features

- Reduced water content required for a given workability
- Retarded setting time characteristics
- Improved workability

Benefits

- Provides flexibility in the scheduling of placing and finishing operations
- Offsets the effects of slump loss during extended delays between mixing and placing
- Reduces waste associated with concrete washwater and returned concrete
- Increased strength – compressive and flexural

Performance Characteristics

Rate of Hardening: The temperature of a concrete mixture and the ambient temperature (forms, earth, air, etc.) affect the hardening rate of concrete. At higher temperatures, concrete hardens more rapidly which may cause problems with placing and finishing.

One of the functions of MasterSet DELVO admixture is to retard the set of concrete. Within the normal dosage range, it will generally extend the working and setting times of concrete containing normal portland cement, fly ash, slag cement and silica fume approximately 1 hour to 5 hours compared to a plain concrete mixture. This depends on job materials and temperatures. Trial mixtures should be made under approximate job conditions to determine the dosage required.

Compressive Strength: Concrete produced with MasterSet DELVO admixture will develop higher early (within 24 hours) and higher ultimate strengths than plain concrete when used within the recommended dosage range and under normal, comparable curing conditions. When MasterSet DELVO admixture is used in heat-cured concrete, the length of the preheating period should be increased until the initial set of the concrete is achieved. The actual heat-curing period is then reduced accordingly to maintain existing production cycles without sacrificing early or ultimate strengths.

Guidelines for Use

Dosage: MasterSet DELVO admixture is recommended for use at a dosage of 4 ± 1 fl oz/cwt (260 ± 65 mL/100 kg) of cementitious materials for most concrete mixtures using average concrete ingredients. For long time-to-discharge applications, such as long hauls, dosages higher than the recommended range may be required. Specifically, for shotcrete applications, MasterSet DELVO admixture is recommended for use at a dosage of 1.5 fl oz/cwt to 25 fl oz/cwt (100 mL/100 kg to 1,500 mL/100 kg) of cementitious materials. Because of variations in job conditions and concrete materials, dosages other than the recommended amounts may be required. In such cases, contact your local sales representative. For concrete washwater and returned concrete stabilization, utilize MasterSet DELVO charts to determine the appropriate dosage rates.

Product Notes

Corrosivity – Non-Chloride, Non-Corrosive: MasterSet DELVO admixture will neither initiate nor promote corrosion of reinforcing steel in concrete. This admixture does not contain intentionally-added calcium chloride or other chloride-based ingredients.

Compatibility: MasterSet DELVO admixture may be used in combination with any BASF admixture. When used in conjunction with another admixture, each admixture must be dispensed separately into the mixture.

Storage and Handling

Storage Temperature: MasterSet DELVO admixture should be stored above freezing temperatures. If MasterSet DELVO admixture freezes, thaw at 35 °F (2 °C) or above and completely reconstitute by mild mechanical agitation. Do not use pressurized air for agitation.

Shelf Life: MasterSet DELVO admixture has a minimum shelf life of 12 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your local sales representative regarding suitability for use and dosage recommendations if the shelf life of MasterSet DELVO admixture has been exceeded.

Packaging

MasterSet DELVO admixture is supplied in specially designed 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

Related Documents

Safety Data Sheets: MasterSet DELVO admixture

Additional Information

For more information on MasterSet DELVO admixture, contact your local sales representative.

The Admixture Systems business of BASF's Construction Chemicals division is the leading provider of solutions that improve placement, pumping, finishing, appearance and performance characteristics of specialty concrete used in the ready-mixed, precast, manufactured concrete products, underground construction and paving markets. For over 100 years we have offered reliable products and innovative technologies, and through the Master Builders Solutions brand, we are connected globally with experts from many fields to provide sustainable solutions for the construction industry.

Limited Warranty Notice

BASF warrants this product to be free from manufacturing defects and to meet the technical properties on the current Technical Data Guide, if used as directed within shelf life. Satisfactory results depend not only on quality products but also upon many factors beyond our control. BASF MAKES NO OTHER WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ITS PRODUCTS. The sole and exclusive remedy of Purchaser for any claim concerning this product, including but not limited to, claims alleging breach of warranty, negligence, strict liability or otherwise, is shipment to purchaser of product equal to the amount of product that fails to meet this warranty or refund of the original purchase price of product that fails to meet this warranty, at the sole option of BASF. Any claims concerning this product must be received in writing within one (1) year from the date of shipment and any claims not presented within that period are waived by Purchaser. BASF WILL NOT BE RESPONSIBLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFITS) OR PUNITIVE DAMAGES OF ANY KIND.

Purchaser must determine the suitability of the products for the intended use and assumes all risks and liabilities in connection therewith. This information and all further technical advice are based on BASF's present knowledge and experience. However, BASF assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights, nor shall any legal relationship be created by or arise from the provision of such information and advice. BASF reserves the right to make any changes according to technological progress or further developments. The Purchaser of the Product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with a full application of the product(s). Performance of the product described herein should be verified by testing and carried out by qualified experts.

Workplan



Contractor's License No. ABC1036

MAIN OFFICE: 648 PIILANI STREET, PO BOX 4669, HILO, HAWAII 96720
PHONE (808) 935-7194 FAX (808) 961-6417

KONA BRANCH: 74-5039B QUEEN KAAHUMANU HWY, PO BOX 3169, KAILUA-KONA, HI 96740
PHONE (808) 329-8051 FAX (808) 329-3261

ESTABLISH 1926

An Equal Opportunity Employer

July 1, 2025

Hilo WWTP Rehabilitation & Replacement Project Phase 1
Probe & Grout Work Plan

Probing:

- 1) Layout of Probe Holes by others
- 2) Depth to drill to be provided by other
- 3) Using a track drill with a 3" bit we will drill to the specified depth
- 4) Documentation and log of probe hole by others
- 5) The hole will be plugged with a PVC plug
- 6) Description of the track drill is attached

Grouting with Concrete Boom Pump Truck:

- 1) Grouting to be performed with an operated 38 Meter Boom Pump Truck
- 2) Boom Pump Pipe to be reduced down to a 2" PVC Pipe to insert into probe hole
- 3) A Laborer will assist with the pipe placement
- 4) Grout to be pumped into hole per direction of the QC Specialist and/or Soils Engineer by others
- 5) Track Drill to standby while grouting, if necessary probe hole will be re-drilled at no cost
- 6) Documentation and log of grout by others
- 7) Recording Equipment by others
- 8) Grout mix to be per approved submittals
- 9) Description of Concrete Boom Pump Truck is attached
- 10) Extra grout disposal, concrete truck washout, and Boom Pump truck washout to be done at a designated concrete washout site constructed, maintained, and disposed of by others

Grouting with Boom Truck and Line Pump:

- 1) Grouting to be performed with an operated 33 Ton Boom Truck and Line Pump
- 2) Line Pump Pipe to be reduced down to a 2" PVC Pipe to insert into probe hole
- 3) Boom Truck to lift and place pipe into probe hole with two Laborers assisting
- 4) Grout to be pumped into hole per direction of the QC Specialist and/or Soils Engineer by others
- 5) Track Drill to standby while grouting, if necessary probe hole will be re-drilled at no cost
- 6) Documentation and log of grout by others
- 7) Recording Equipment by others
- 8) Grout mix to be per approved submittals
- 9) Description of 33 Ton Boom Truck is attached
- 10) Extra grout disposal, concrete truck washout, and Line Pump washout to be done at a designated concrete washout site constructed, maintained, and disposed of by others

38M

JXZZ 38-5.16



EQ#2172



GENERAL

PIPE SIZE (ID) **125 mm (5")**

BOOM CONTROL VALVE **Proportional (by HAWE)**

RADIO REMOTE **Dual Wireless Transmitter System**

VIBRATOR **Standard**

WATER PUMP **Hydraulic Power 20 bar (290 psi)**

WATER TANK **800 L (211 G)**

WEAR PARTS **Carbide**

- POPULAR UPGRADES[†]**
- LED Boom Light Kit
 - LED Outrigger Lights
 - Heated Water Tank
 - Heated Hydraulic Tank
 - Air-Cuff
 - Twin Wall Pipe
 - 20 Cell Pump Kit
 - 18 Cell Pump Kit

BOOM

NUMBER OF BOOMS **5 Sections**

FOLDING TYPE **ZZ Fold**

VERTICAL HEIGHT **37.5 m (123')**

HORIZONTAL REACH **33.5 m (109'11")**

UNFOLDING HEIGHT **7.3 m (23'11")**

1ST SECTION **7.8 m (25'7")**

2ND SECTION **6.1 m (20")**

3RD SECTION **6.3 m (20'8")**

4TH SECTION **6.6 m (21'8")**

5TH SECTION **6.7 m (22')**

OUTRIGGER **X-Style**

FRONT SPREAD **6.0 m (19'8")**

REAR SPREAD **7.8 m (25'7")**

PUMP

OUTPUT: **Rod Side 164 m³/h (215 yd³/h)**

Piston Side 102 m³/h (133 yd³/h)

PRESSURE: **Rod Side 72 Bar (1044 psi)**

Piston Side 115 bar (1668 psi)

CONCRETE CYLINDER DIAMETER **230 mm (9")**

CONCRETE CYLINDER TYPE **Hard Chromed**

STROKE LENGTH **2100 mm (83")**

S-TUBE SIZE **9" x 7"**

MAIN OIL PUMP **Rexroth hydromatic A11VLO260**

HYDRAULIC SYSTEM PRESSURE **350 bar (5076 psi)**

LUBE SYSTEM (HOPPER) **Automatic**

SWITCHING SYSTEM **Hydraulic**

HOPPER CAPACITY **Easy Clean 600 L (158 G)**

NUMBER OF STROKES/MIN **31**

OUTPUT CONTROL RANGE **10(13)-164m³/h (215yd³/h)**

[†]Not to be used through boom pipe

[†]More options available, ask your sales rep for details.

Alliance Concrete Pumps Inc. reserves the right to make changes to all specifications

ALLIANCECONCRETEPUMPS.COM



USA OFFICE: 800 West Ridge Road, Linwood, PA 19061
Toll Free 1.888.584.7231 | Phone 610.584.7231 | Fax 610.584.7251

CANADA OFFICE: 26162 30A Avenue, Aldergrove, BC V4W 2W5
Toll Free 1.888.870.0908 | Phone 604.607.0908 | Fax 604.607.0903



38M WEIGHTS/DIMENSIONS

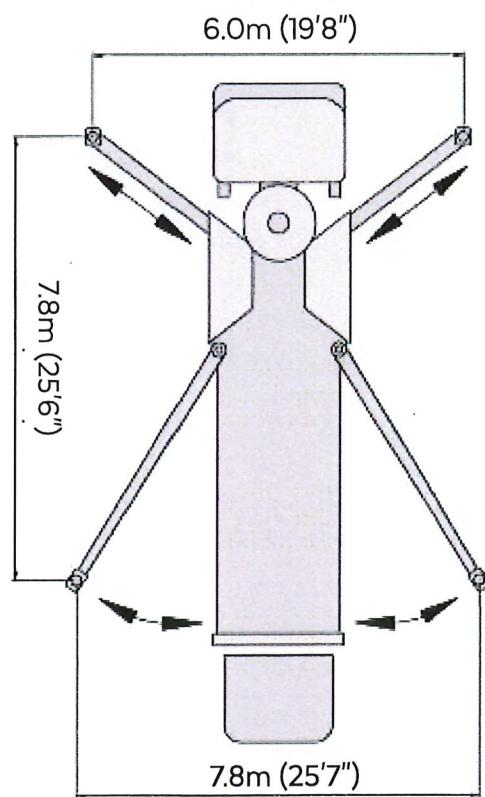


CHASSIS

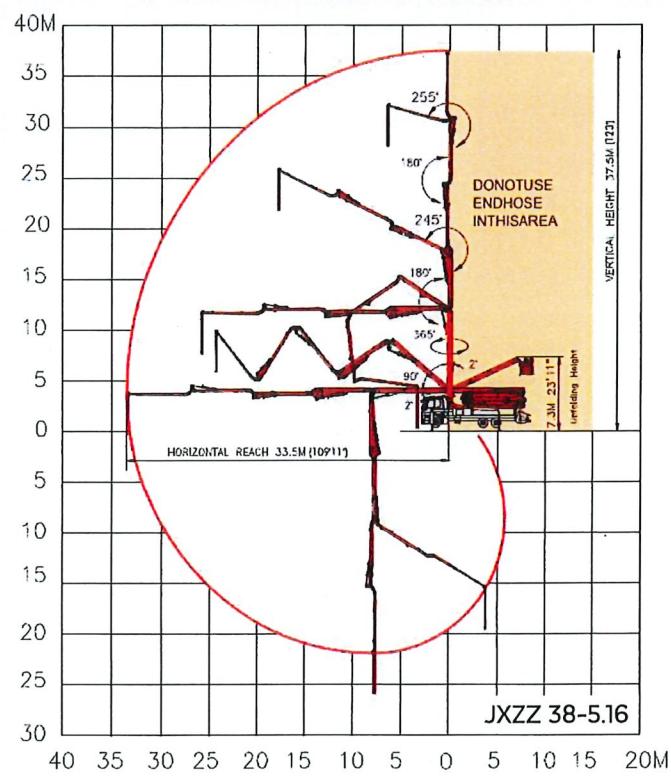
MAKE/MODEL	FRONT AXLE	REAR AXLE	OVERALL LENGTH	TOTAL WEIGHT
LARGE CONVENTIONAL	18,300 lbs	43,800 lbs	39'2" / 11.94m	62,100 lbs
CAB OVER	19,900 lbs	40,500 lbs	36'10" / 11.25m	60,400 lbs

DIAGRAMS

OUTRIGGER EXTENSION



BOOM PUMP REACH



Grove Manitowoc National Crane Potain



EQ# 2204

33 Ton Boom Truck

National Crane Series 1400H

Product Guide



Features

- 29,9 t (33 USt) rating
- 38,72 m (127 ft) five-section boom
- Self-lubricating Easy Glide wear pads
- Internal anti-two-block



Features

National Crane 1400H

- 29,9 t (33 USt) maximum capacity
 - 50,3 m (165 ft) maximum vertical reach*
 - 41,15 m (135 ft) maximum vertical hydraulic reach
- *Maximum vertical reach is ground-level to boom tip height at maximum extension and angle with outriggers/stabilizers full extended.



Five-section boom

At 38,72 m (127 ft), the Series 1400H five-section boom is the longest in its size range. The long boom allows the operator to perform more lifts without the use of a jib, reducing setup time and improving efficiency.

Easy Glide boom wear pads

Easy Glide boom wear pads reduce the conditions that cause boom chatter resulting in smoother crane operation.



Overload protection

All National Crane boom trucks are equipped with overload protection. A Load Moment Indicator (LMI) is standard on all Series 1400H machines. The LMI display console is weatherproof. The LCD display is visible in full or low light and displays all crane load lifting values simultaneously.



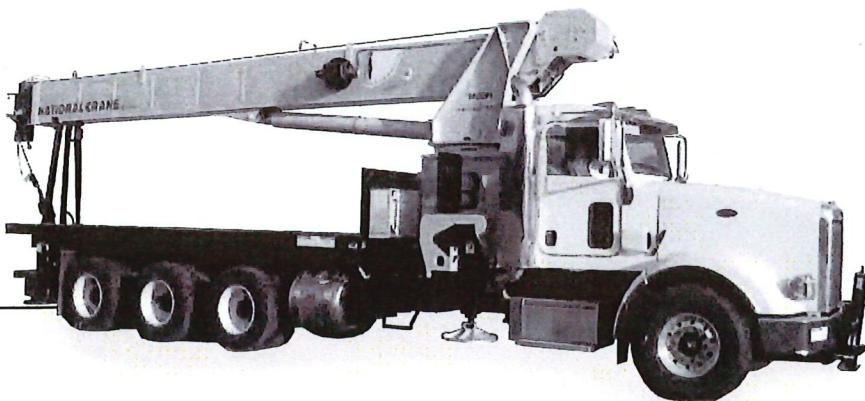
Outriggers

Mainframe outriggers are crossframe H-style, with 7,47 m (24 ft 6 in) span, with a mid-span setting of 5,64 m (18 ft 6 in). Rear stabilizers are H-style with 5,64 m (18 ft 6 in) span. Removable ball and socket aluminum outrigger pads are included on mainframe outriggers.

Features

Best in class performance and serviceability

- The stronger standard torsion box improves rigidity, reduces truck frame flex and reduces the need for counterweight
- Speedy-reeve boom tip and sheave blocks simplify rigging changes by decreasing the time needed to change line reeving
- Crane components painted before assembly reduce the chance of rust, improve serviceability and enhance the appearance of the crane
- Internal anti-two block wiring standard on the 1400H routes the wiring through the inside of the boom eliminating the possibility of snagging the wire on obstructions
- Bearings on the boom and retract cables can be greased through access holes in the boom side plates and number of internal boom parts has been reduced improving serviceability
- The Series 1400H is supplied with 375° non-continuous rotation standard
- Adjustable swing speed comes standard on the 1400H. A control knob located on the swing motor brake release valve can be easily adjusted to the crane operator's swing speed preference
- Radiator mounted on truck frame with electric fan is standard



Contents

Features	2
Mounting configurations	5
Specifications	6
Capacities	8
Dimensions	14
Accessories	15

Mounting configuration

The mounting configuration shown is based on the Series 1400H with an 85% stability factor. The complete unit must be installed in accordance with factory requirements and a test performed to determine actual stability and counterweight requirements since individual truck chassis vary. If bare truck weights are not met, counterweight will be required. Chassis must be equipped with a front frame extension suitable for SFO addition. Contact factory for complete chassis specifications.

Working area	360°
Gross Axle Weight Rating Front	9072 kg (20,000 lb)*	
Gross Axle Weight Rating Rear	18 144 kg (40,000 lb)*	
Gross Vehicle Weight Rating	27 216 kg (60,000 lb)*	
Wheelbase	Minimum 681 cm (268 in)	
Cab to Axle/trunnion (CA/CT)	Minimum 518 cm (204 in)	
After Frame (AF)	305 cm (120 in) minimum	
Frame Section Modulus (SM), front axle to end of afterframe, with (758 MPa 110,000 PSI)	492 cm ³ (30 in ³)	
Stability Weight, Front	4196 kg (9250 lb) minimum**	
Stability Weight, Rear	3674 kg (8100 lb) minimum**	
Estimated Average Final Weight	23 360 kg (51,500 lb)***	

The diagram shows the 360° working area that can be achieved with the front stabilizer (optional on the Series 1400H). The front stabilizer is required when extending the boom and lifting loads forward of the outriggers. A minimum of 164 cm³ (10 in³) section modulus at 759 MPa (110,000 psi) is required from the rear of the front spring hanger forward to the front stabilizer. Integral front frame extension required.

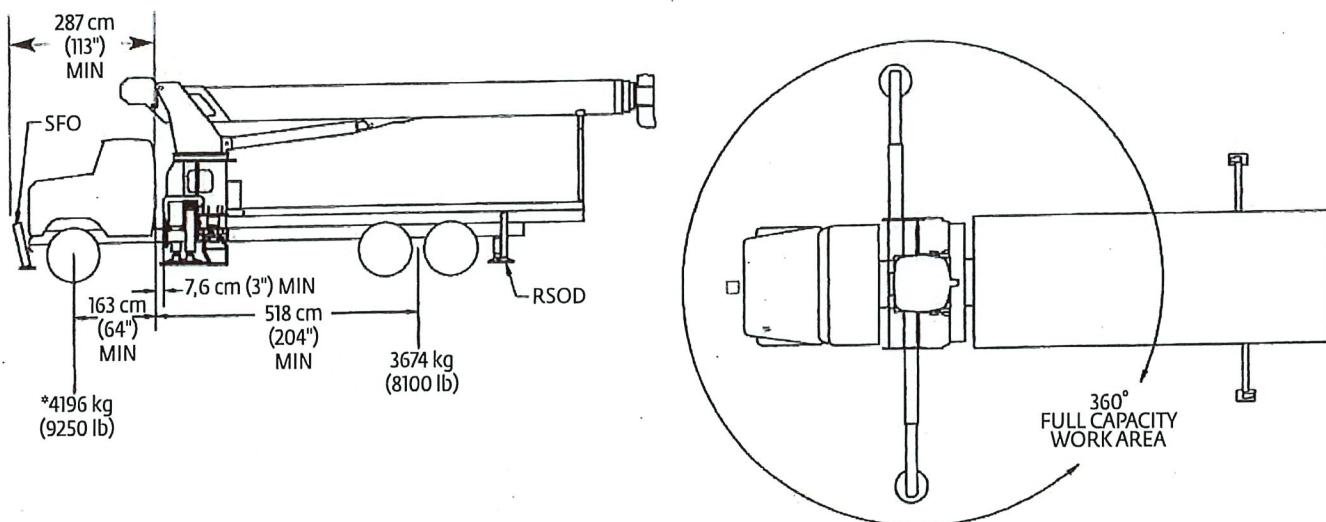
* Required to mount basic crane with 9,15 m (30 ft) jib option. Additional options or heavier bare chassis weights will require additional axles or a GVWR in excess of 27 216 kg (60,000 lb); in some states, special permits for overload are required.

** Estimated axle scale weights prior to installation of crane, stabilizers and subbase for 85% stability.

*** Includes basic crane without jib, 379 L (100 gal) fuel tank, 22 ft wood flatbed, hydraulic pump and PTO, rear bumper, rear stabilizer, boom rest, and two workers, 136 kg (300 lb) in cab.

Note: Chassis will require integral extended front frame rails for SFO addition.

Truck requirements



Notes:

- Gross Vehicle Weight Rating (GVWR) is dependent on all components of the vehicle (axles, tires, springs, frame, etc.) meeting manufacturers' recommendations; always specify GVWR when purchasing trucks.
- Diesel engines require a variable speed governor and energize-to-run fuel solenoid for smooth crane operation. Electronic fuel-injected engines are required.

- All mounting data is based on a National Series 1400H with the standard subbase and an 85% stability factor.
- The complete unit must be installed in accordance with factory requirements, and a test performed to determine actual stability and counterweight requirements per SAE J765; contact the factory for details.
- Transmission neutral safety interlock switch is required.

Specifications

Boom and jib combinations data

Model 14127H — Equipped with a 9,63 m - 38,72 m (31 ft 7 in - 127 ft) five-section boom. This model can be equipped with a 9,15 m (30 ft) single-section jib. Maximum tip height with 9,15 m (30 ft) jib is 50,00 m (164 ft).

9,63 m - 38,72 m (31 ft 7 in - 127 ft) five-section boom

14FJ30M 9,15 m (30 ft) single-section jib

Note: Maximum tip is measured with outriggers/stabilizers fully extended.

Specifications

1400H winch data

- Do not deadhead line block against boom tip when extending boom
- Keep at least 3 wraps of loadline on drum at all times.
- Use only 5/8" in diameter rotation-resistant cable with 45,400 lb breaking strength on this machine.
- MAXIMUM BOOM LENGTH AT MAXIMUM ELEVATION WITH RIGGING SHOWN WITH LOAD BLOCK AT GROUND LEVEL

1 part line	2 part line	3 part line	4 part line	5 part line	6 part line	7 part line	8 part line
							
127 ft boom with 54 ft jib	110 ft	83 ft	64 ft	52 ft	43 ft	36 ft	31 ft

Winch	Cable supplied	Average breaking strength	Lift and speed	Lift and speed	Lift and speed	Lift and speed	Lift and speed	Lift and speed
Low speed	5/8" diameter rotation resistant	20 593 kg (45,400 lb)	4082 kg (9000 lb) 52 m/min (170 fpm)	8165 kg (18,000 lb) 26 m/min (85 fpm)	12 247 kg (27,000 lb) 17 m/min (57 fpm)	16 329 kg (36,000 lb) 13 m/min (43 fpm)	20 412 kg (45,000 lb) 10 m/min (34 fpm)	24 494 kg (54,000 lb) 9 m/min (28 fpm)
High speed	5/8" diameter rotation resistant	20 593 kg (45,400 lb)	1996 kg (4400 lb) 104 m/min (340 fpm)	3992 kg (8800 lb) 52 m/min (170 fpm)	5987 kg (13,200 lb) 34 m/min (113 fpm)	7983 kg (17,600 lb) 26 m/min (85 fpm)	9979 kg (22,000 lb) 21 m/min (68 fpm)	11 975 kg (26,400 lb) 17 m/min (57 fpm)

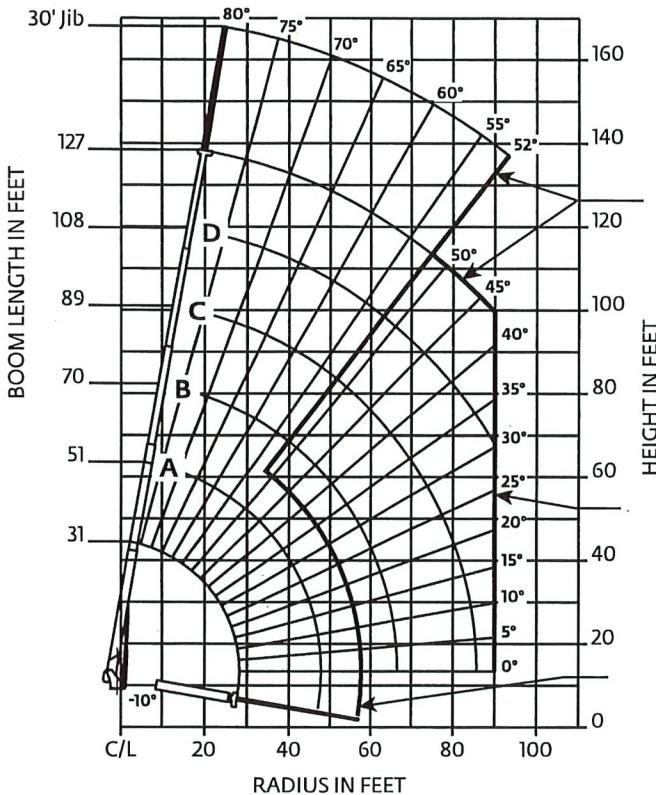
Winch	Full drum pull
Standard planetary	1996 kg (4400 lb) high speed 4082 kg (9000 lb) low speed

Loadline deduct		
Block type	Rating	Weight
Downhaul weight	4,53 t (5 USt)	82 kg (180 lb)
1-sheave block	13,60 t (15 USt)	170 kg (375 lb)
2-sheave block	22,67 t (25 USt)	290 kg (640 lb)
3-sheave block	31,74 t (35 USt)	395 kg (870 lb)
4-sheave block	32,65 t (36 USt)	440 kg (970 lb)

Capacities

**Series 14127H: 38.7 m (127 ft) boom with 9.1 m - 16.45 m (30 ft - 54 ft) jib/full-span outrigger
7.5 m (24 ft 6 in)**

Other Series 1400H Load Rating Charts are available. National Crane will send you a chart on request – or you may secure needed load rating information through your nearest National Crane dealer.



CAUTION:

- Do not operate crane booms, jib extensions, any accessories or loads within 10 ft (3 m) of live power lines or other conductors of electricity.
- Jib and boom capacities shown are maximum for each section.
- Do not exceed capacities at reduced radii.
- Load ratings shown on the appropriate charts are maximum allowable loads with the crane mounted on a factory-approved truck and all outriggers at either full span or at mid span range and set on a firm level surface so that the crane is level and all tires are suspended.
- Always level the crane with the level indicator located on the crane.
- The operator must reduce load to allow for factors such as wind, ground conditions, operating speeds and their effects on freely suspended loads.
- Overloading this crane may cause structural collapse or instability.
- Weights on any accessories attached to the boom or loadline must be deducted from the load chart capacities.
- Do not exceed jib capabilities at any reduced boom lengths.
- Do not deadhead lineblock against boom tip when extending boom or winching up.
- Keep at least three wraps of loadline on drum at all times.
- Use only specified cable with this machine.

NOTE:

1. Operate with jib by radius when main boom is fully extended. If necessary increase boom angle to maintain loaded radius.
2. Operate with jib by boom angle when main boom is not fully extended. Do not exceed rated jib capacities at any reduced boom lengths.

Load chart

LOAD RADIUS (ft)	LOADED BOOM ANGLE	31 ft BOOM (lb)	LOADED BOOM ANGLE	A 51 ft BOOM (lb)	LOADED BOOM ANGLE	B 70 ft BOOM (lb)	LOADED BOOM ANGLE	C 89 ft BOOM (lb)	LOADED BOOM ANGLE	D 108 ft BOOM (lb)	LOADED BOOM ANGLE	127 ft BOOM (lb)
6	79.9	66,000										
8	76	47,550										
10	71.9	40,750	79.7	32,700								
12	67.7	35,800	77.4	29,750								
15	61.1	30,200	72.8	25,900	78.1	22,550						
20	49.5	23,950	67.7	20,450	74.8	18,950	78.8	16,600				
25	33.1	17,700	61.2	16,750	70.4	15,350	74.7	14,200	78.1	12,250	80.3	8200
30			54.1	14,000	65.9	12,850	72.2	11,850	76.1	10,550	78.5	7900
35			46.2	10,550	61.1	10,650	68.6	9700	73.6	9050	76.4	7600
40			36.5	8100	55.2	8350	64.3	8300	69.8	7850	73.8	7200
45			25.7	6250	50.9	6500	61.5	6700	67.8	6750	71.5	6400
50					45	5100	57.4	5300	64.6	5400	69.5	5500
55					38.3	4000	53.2	4200	61.4	4300	66.8	4400
60					29.8	3150	48.1	3300	57.4	3400	63.6	3500
65					19.1	2400	44	2600	54.6	2700	61.3	2800
70							38.7	2000	51.1	2100	58.4	2150
75							32.6	1450	47.3	1550	55.5	1650
80							24.5	1000	43.2	1100	52.2	1200
85							14	650	38.9	750	49.4	800
90											45.6	500
	0	12,150	0	4800	0	2000	0	500				
ADD TO CAPACITIES WHEN NO JIB STOWED (lb)			500	300	250	200	150	100				

LOAD RADIUS (ft)	LOADED BOOM ANGLE	30 ft JIB (lb)
30	79.9	3900
35	79.1	3850
40	77.5	3700
45	75.9	3550
50	74.2	3400
55	72.5	3250
60	70.7	3100
65	68.9	2950
70	66.4	2600
75	64.4	2050
80	62.1	1600
85	59.7	1200
90	57.3	850
95	54.8	550

*Shaded areas are structurally limited capacities.

THIS CHART IS ONLY A GUIDE AND SHOULD NOT BE USED TO OPERATE THE CRANE.

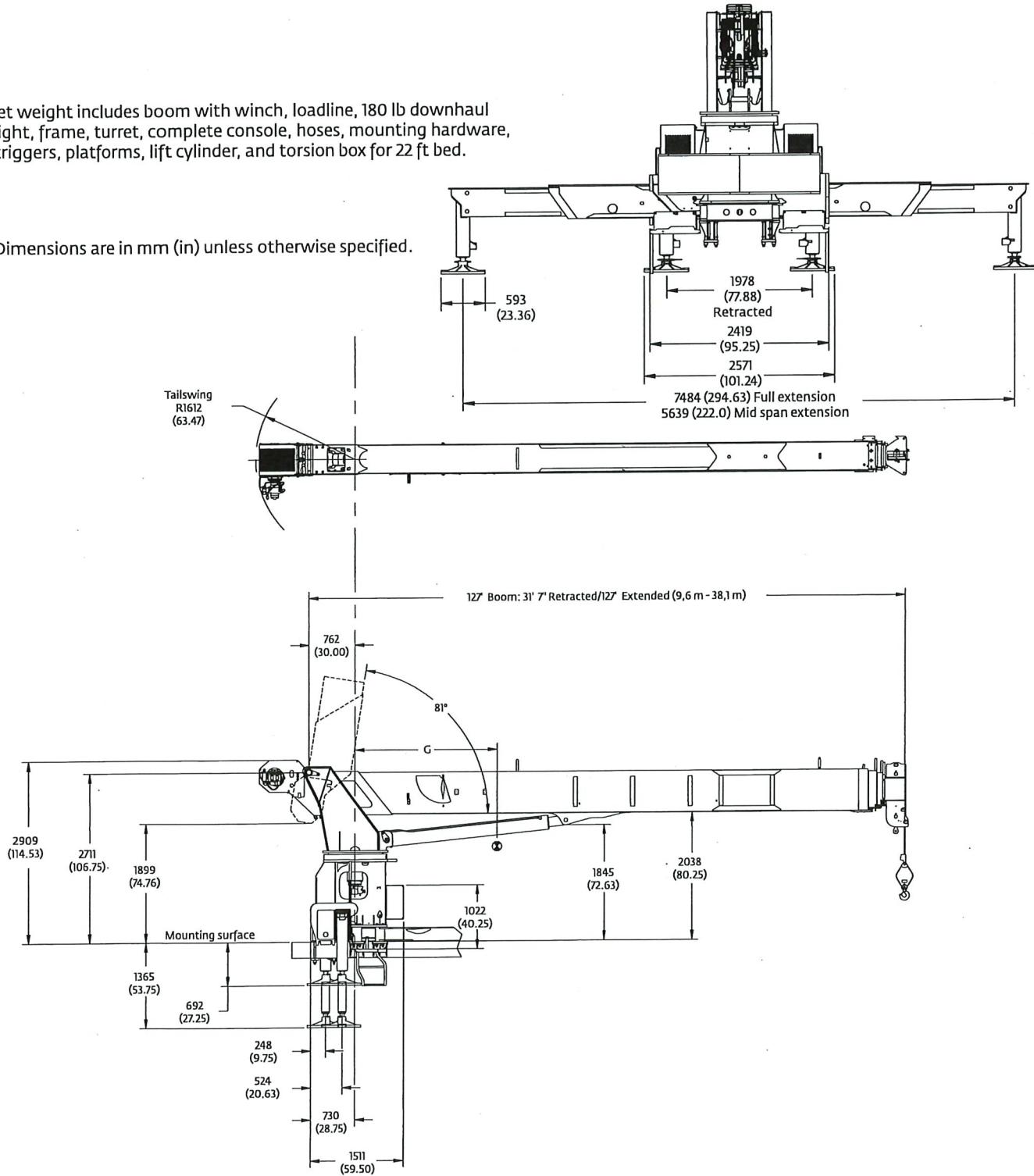
The individual crane's load chart, operating instructions and other instructional plates must be read and understood prior to operating the crane.

Dimensions

	Retracted	Extended	G	wet/wt*
Series	Length	Length	cm (in)	kg (lb)
14127H	31 ft 7 in	127 ft	230 (90.4)	12 869 (28,371)

*Wet weight includes boom with winch, loadline, 180 lb downhaul weight, frame, turret, complete console, hoses, mounting hardware, outriggers, platforms, lift cylinder, and torsion box for 22 ft bed.

Dimensions are in mm (in) unless otherwise specified.



Accessories

Radio Remote Controls –

Eliminate the handling and maintenance concerns that accompany cabled remotes. Operate to a range of about 76 m (250 ft), varying with conditions.

- NB4R

Heavy-duty Personnel Basket –

One and two-person baskets for main boom and jib are available.

- BSA-1
- BSA-R1 (provides rotation)
- BSAY-2

Spanish-Language Danger Decals, Control Knobs, and Operators' Manuals

- SDD
- SOM



Manitowoc Cranes

Regional headquarters

Americas

Manitowoc, Wisconsin, USA
Tel: +1 920 684 4410

Shady Grove, Pennsylvania, USA
Tel: +1 717 597 8121

Europe, Middle East, Africa

Dardilly, France - TOWERS
Tel: +33 (0)4 72 18 20 20

Wilhelmshaven, Germany - MOBILE
Tel: +49 (0) 4421 294 0

China

Shanghai, China
Tel: +86 21 6457 0066

Middle East and Greater Asia-Pacific

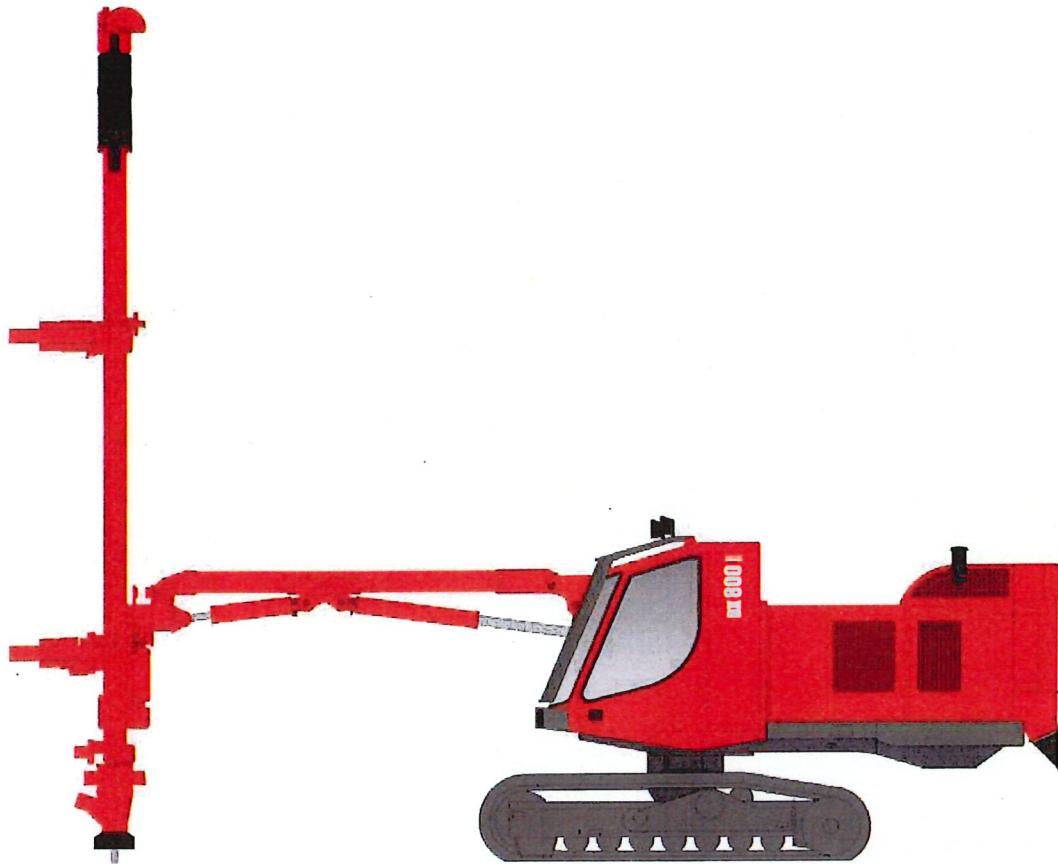
Singapore
Tel: +65 6264 1188

Dubai, UAE
Tel: +9714 8862677



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www.manitowoc.com



APPLICATION

Sandvik DX800 is a hydraulic, self-propelled, self-contained, crawler based surface drilling rig equipped with a cabin (F.O.P.S. and R.O.P.S.) and rod handling system. It drills vertical, inclined or horizontal holes with a diameter of 64 - 127 mm (2 1/2" - 5") utilizing 38, 45 or 51 mm (1 1/2", 1 3/4" or 2") extension rods.

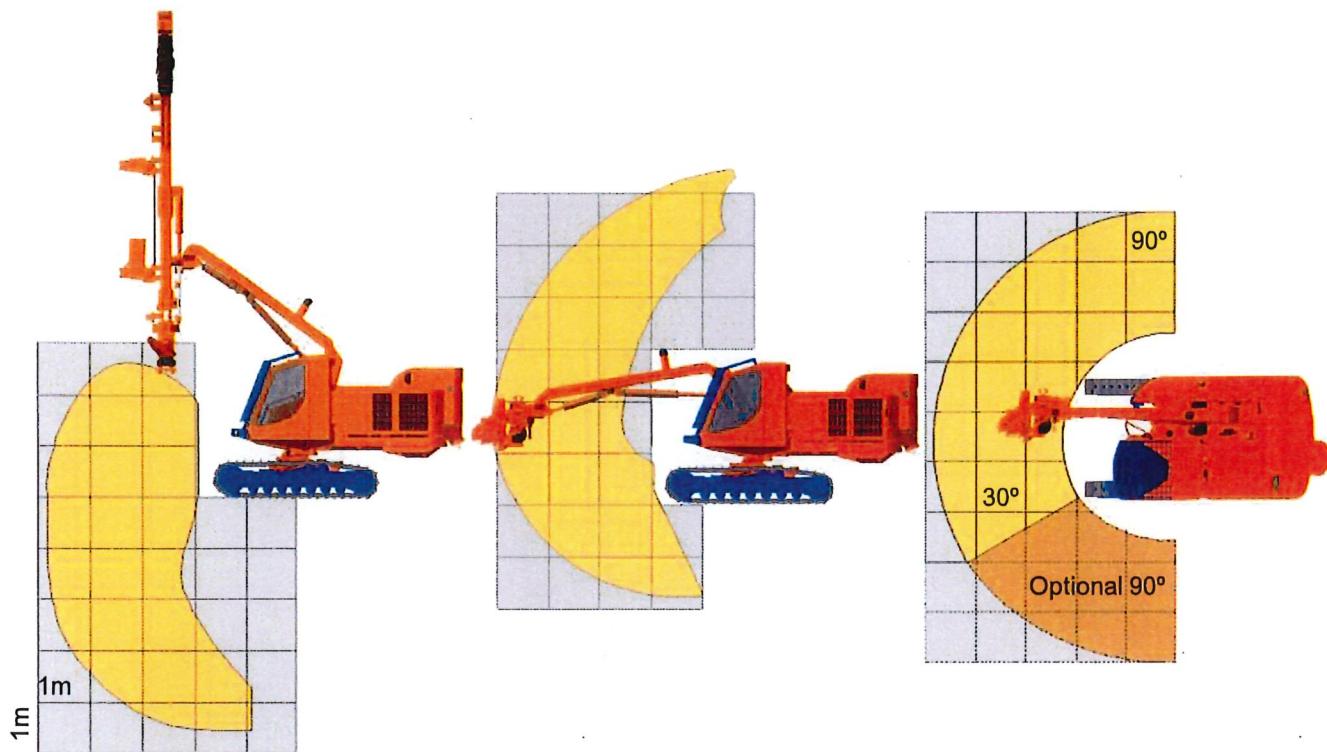
DX800 is equipped with HL 800 T, hydraulic top hammer rock drill. With high rotation torque, sufficient flushing and sophisticated ergonomic drilling control system the rig is well suited also in very fractured rock conditions. The rock drill and articulated boom are mounted on the turnable superstructure giving a drilling coverage of 17,6 m² (optionally 26,4 m²).

The powerpack of DX800 consists of a Caterpillar diesel engine and a gearbox, which divides the power for hydraulic pumps and flushing air compressor. The powerpack is mounted crosswise at the rear end of the superstructure to keep counterweight on the opposite side of the boom and feed regardless of the drilling direction.

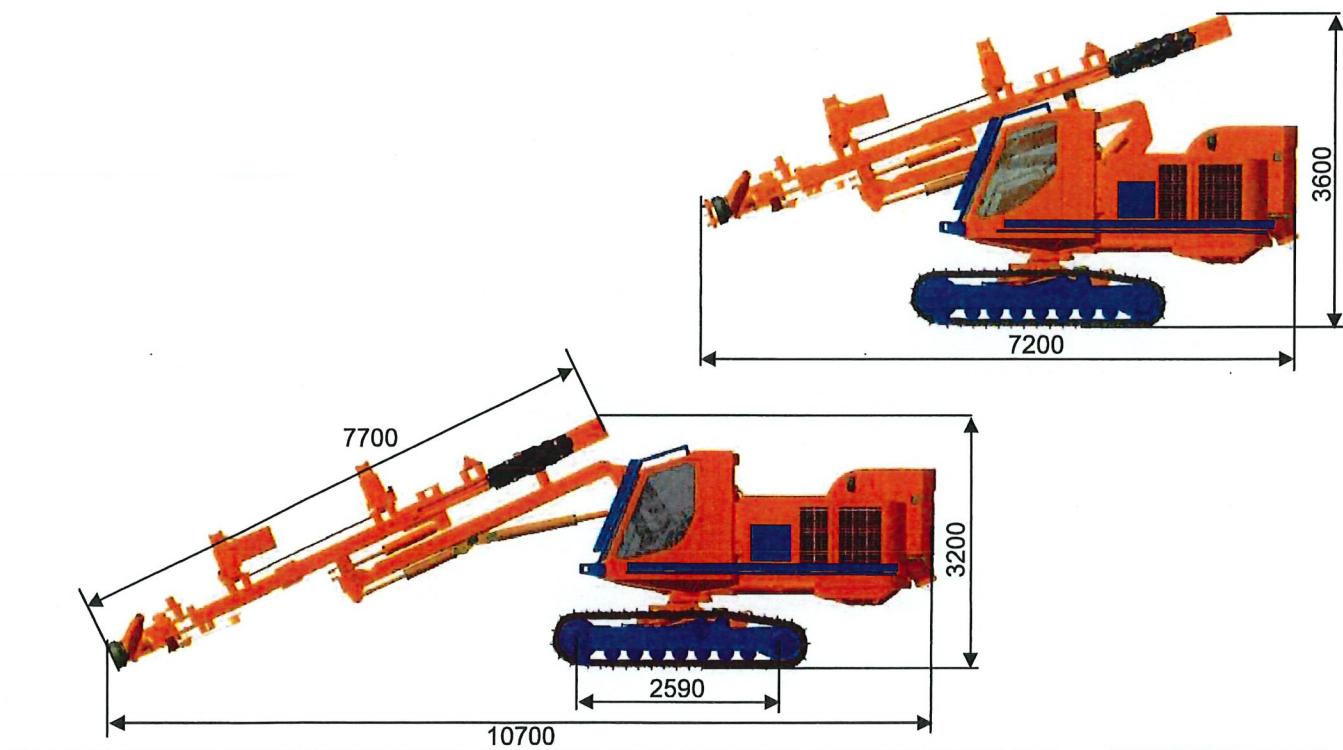
DX800 has an ergonomic cabin to increase operator's safety and visibility. The cabin is certified for R.O.P.S. (ISO-3471 Roll-Over protection Structure) and F.O.P.S. (ISO-3449 Falling Object Protection Structure). Windows are laminated for added safety. The noise level in the cabin is less than 80 dB(A). To keep dust at a minimum, the cabin is fitted with efficient filters for incoming fresh air. Adjustable seat, good visibility, adequate lighting and an optimum working temperature are among the many features ensuring a good operating environment. Drilling functions are proportionally controlled by one hydraulic joy-stick. Several routine functions e.g. antijamming are executed automatically. There are fewer levers to make it easy to use. Driving, rear jack and winch control can be done outside the cabin from the optional remote control box.

Typical applications for DX800 are road cutting, pipeline drilling and foundation drilling, as well as production drilling in medium size quarries. Therefore DX800 is most often used by construction contractors, mines and quarries, and also included in the equipment fleet of rental houses as well.

DRILLING DIMENSIONS



TRANSPORT DIMENSIONS



STANDARD COMPONENTS

1. Rock drill HL 800 T, hydraulic
2. Chain feed CF 145H
3. Rod handler RH 714 incl. 1 set of jaws
4. Boom DB 800H, articulated
5. Carrier Track mounted, turnable superstructure
6. Powerpack Diesel driven, hydraulic pumps and on-board compressor
7. Hydraulic system Load sensing and open center
8. Control system THC 700 Rock Pilot
9. Movable drill steel support
10. Operator's cabin F.O.P.S. and R.O.P.S.
11. Dust collection system DC 800 H, hydraulic
12. Working lights 9 pcs
13. Gauge set For accumulator pressure checking
14. Reversing alarm
15. Manuals Service and spare parts manuals:
2 x paper copy
2 x CD-ROM (Toolman)
16. EU-safety devices

TRANSPORT DIMENSIONS

Weight (without options)	14 900 kg
Width	2.45 m
Height	3.6 m / 3.2 m
Total length	7.2 m / 10.7 m

THE JAWS FOR DRILL STEELS

	Drill steel type	Drill steel diameter	Recommended hole diameter
1.	Extension rods	38 mm 1 1/2"	64 - 70 mm 2 1/2" - 2 3/4"
2.	MF-rod	38 mm 1 1/2"	64 - 70 mm 2 1/2" - 2 3/4"
3.	Extension rods	45 mm 1 3/4"	76 - 89 mm 3" - 3 1/2"
4.	MF-rod	45 mm 1 3/4"	76 - 89 mm 3" - 3 1/2"
5.	MF-rod	51 mm 2"	89 - 127 mm 3 1/2" - 5"
6.	Extension rods	51 mm 2"	89 - 127 mm 3 1/2" - 5"

Note

- not with 10' MF-rods
- with hose reel only 10' or 12' rods
- 51 mm (2") extension rods only 5 + 1
- if several jaws selected please specify jaws assembled

SELECTION OF OPTIONS

1. Turnable superstructure 180°
2. Air conditioning
3. Rod greasing system
4. P&Q electric vertical angle indicator (± 6 deg.)
5. Electric angle indicator TIM 2302 with aiming unit
6. Measuring system TIM 2303 with aiming unit
7. Laser based measuring system TIM 2305
8. Power extractor
9. Electric filling pump for refuelling
10. Remote control box; for rear ground support, driving and oscillation
11. Remote control box + hydraulic winch with cable tightness automatics (replaces and includes previous option)
12. Hydraulic rear ground support
13. Three-bar grouser plates
14. Guides for grousers
15. Towing hook
16. Fuel operated heater for cabin, hydr. oil and engine
17. Flushing control automatics
18. Shut down of suction for water holes
19. Readyness for Power extractor
20. Sanrock Mini H hydraulic bit grinder
21. Primary separator PE 50
22. Horizontal drilling kit (includes hose reel)
23. Hose reel (not with 14' rods)
24. Radio with CD player
25. Central lubrication system
26. Kit for alternative steels
27. Water injection system with tank
28. Water injection system w/o tank
29. Zero Dust system
30. Biodegradable hydraulic oil, Shell naturelle HFE 46 or HFE 68 (synthetic ester)
31. Extra manuals
32. First service kit for DX800²
33. Special tools for HL 800 T, field kit ID 550 055 29
34. Special tools for HL 800 T, complete ID 550 302 70
35. Antifreeze for air lines
36. Vacuum cleaner for cabin

Sandvik Mining and Construction reserves the right to change this specification without further notice.

Log template to record observations

FIELD PROBING AND GROUTING RECORD



PROJECT: _____ Project No.: _____
 FIELD ENGINEER: _____

STRUCTURE: _____ PROBE NO.: _____

DEPTH	SEC.	OBSERVATIONS			
1			Probing Record		
2			Date of Probing:		
3			Ground Elevation:	ft MSL	
4			Bottom of Footing Elevation:	ft MSL	
5			Grouting Record		
6			Date of Grouting:		
7			Depth of Borehole:	ft	
8			Anticipated Grout Volume:	Cubic Yards	
9			Volume per Stroke:		
10			Number of Strokes:		
11			Actual Grout Volume:	Cubic Yards	
12			Number of Grout Reapplication:		
13			Remarks:		
14		3.5" Dia. Hole	10	FT	
15		Volume			
16		0.6681	Ft ³		
17		0.0247	Yd ³		
18		4.8883	Gallons		
19					
20					