MSHA Approval Number: 120M-11.4
120 psi MICON Main Line Hybrid II Seal
For information, contact MICON at (412) 664-7788

Covered by U.S. Patent No. 8,342,776 and/or one or more pending International Patent applications
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INSTALLATION GUIDELINES
(In Mine Openings up to 32.5-feet High by up to 28-feet Wide)

MATERIALS, SITE PREPARATION, AND QUALITY CONTROL

1. The materials used in the installation of the MICON HYBRID II seal include, but are not limited to:

    a. Solid, concrete masonry unit (CMU) blocks,
    b. Prepackaged #57 or smaller gravel and/or pea gravel (herein referred to as "gravel"),
    c. SIGNUM & HybriBond, which are two-component, liquid polymers (herein referred to as "Micon Seal PUR" when either is an acceptable option),
    d. Untreated wood wedges,
    e. Fibrous filler chinking material/hemp/jute/open cell backer-rod (herein referred to as "chinking").

2. Each component of Micon Seal PUR is packaged in sealed containers.

3. The storage requirement for the CMU blocks, wood wedges, and prepackaged (e.g. bags, buckets, etc.) gravel is a dry location and/or a location protected with a covering. The use restriction for these materials is that their outer surfaces are not visibly wet; some drops of condensation are allowed.

4. CMU blocks should be at least 40° F at the time of installation.

5. The use requirement for the Micon Seal PUR is the temperature of each component in its container shall be from 40° F to 100° F. The MICON technician shall take temperature readings of both components in their containers before use. Micon Seal PUR's manufacturer name, lot number, and date of manufacture shall be labeled on the container or supplied via documentation referencing the lot number (e.g. bill of lading); the lot number provides verification of all pertinent information. Material older than 12 months from manufacture date is not to be used for seal construction.

6. MICON shall not install the MICON Hybrid II seal unless the CMU has been supplied by a MICON-sanctioned block manufacturer.

7. The location(s) for the MICON seal shall be chosen by the mine and documented in their MSHA-approved ventilation/sealing plan and would be in compliance with the mine's MSHA-approved roof control/other plan(s). The mine P.E. shall certify that the strata at the chosen seal location has an average shear strength of 288-psi.

8. The front face of the outby wall and the back face of the inby wall of the MICON HYBRID II seal should ideally be 10 feet from any rib line, but not less than 5 feet. If a distance of less than 10 feet, but greater than 5 feet is the only possibility, the mine's P.E. shall assure the ribs are competent before MICON would start construction of their seal. If required by either MSHA or the mine P.E., ribs less than 10 feet, but at least 5 feet, shall be reinforced as approved by the MSHA District Manager.

9. The location for the MICON seal shall be free of standing water. Any running water shall be diverted from the seal location. If present, water shall be removed and "B" Bond, or equal, shall be used to dry the area prior to seal construction.

10. All metallic material, such as roof screens, conduit lines, mine rails, etc., shall be removed in the location of the MICON seal to ensure no metallic material will penetrate completely through the MICON seal's interior. Roof bolts, roof bolt plates, roof pans, and any other metallic material, which would be either completely or partially contained within the seal, can be left in place as long as said object does not pass completely through the seal.

11. Remove loose and soft material as practical from the roof, ribs, and floor, exposing competent rock/coal/strata at the seal location for at least the proposed, total thickness of the seal. All debris 50-feet inby and 50-feet outby the seal location shall have been removed by the coal mining company by the time the seal is completed. Hitching into the competent ribs is not required.

12. Clear exposed surfaces of accumulations of excess dusts or loose materials removeable by brushing, air blowing, or equal. Washing the surfaces with water is allowed only if the surfaces are allowed to dry to normal mine conditions prior to construction. The strata surfaces do not have to be completely dust-free for seal installation, provided the loose dust is removed.

13. After practical loose material is removed from the roof, ribs, and floor, determine the maximum height and width of the "cleaned" mine opening within the footprint of the proposed seal. MICON personnel shall verify the maximum dimensions of the "cleaned" mine opening.

14. Using the seal-thickness charts, MICON personnel shall establish the minimum thickness of the MICON seal's core for the maximum height and width measured (both rounded upward to the nearest 0.25 foot) for the "cleaned" mine opening.

15. If the "cleaned", mine-opening width exceeds 28 feet, a MICON Hybrid II seal could not be constructed.

16. If the "cleaned", mine-opening height exceeds 32.5 feet, a MICON Hybrid II seal could not be constructed.

17. If the "cleaned", mine-opening height is less than 4 feet, the minimum core thickness for a 4-feet height shall be used.

18. The 120-psi MICON HYBRID II seal shall only be installed by personnel who either (a) have been trained on the installation of the MICON seal and are working under the direction of a MICON representative, (b) are trained MICON employees, and/or (c) are mine workers under the direction of the on-site MICON representative. All MICON workers receive general underground and specific training at least annually as per the applicable sections of 30 CFR Part 48 and received documentation of said training via MSHA Form 5000-23. Prior to every seal installation job, all the MICON workers, who would be installing those seals, receive not only site-specific training, but also training on the mine's MSHA-approved plan to which the seals are to be built.

19. The 120-psi MICON HYBRID II, mainline seal may have multiple, sampling or water-monitoring pipes from 1/8" to 1" in diameter. Any high-density polyethylene, PVC, CPVC or similar, non-metallic material approved by the mine P.E., having an internal pressure rating of at least 240-psi, would be acceptable for these pipes.

20. The valves and fittings outside of the mine seal shall be made of corrosion-resistant or plastic/epoxy-coated, metallic material having an internal pressure rating of 240-psi. Non-metallic valves and fittings can be used provided they have an internal pressure rating of at least 240-psi.

21. Water-monitoring pipes, when required, shall be installed as per the mine's MSHA-approved sealing plan.

22. At least one sampling pipe should be installed a maximum of 12" from the roof on the inby side and extended to the center of first, inby crosscut supported along its length as per the mine's approved seal plan. When installing a MICON Hybrid II seal in front of existing seals, extend existing vent pipes if available.

23. The 120-psi, MICON HYBRID II, mainline seal may have water drainage pipe(s), with a configuration of either up to three (3), 8" or smaller internal diameter pipes or up to four (4), no more than 6" or smaller internal diameter pipes, water drainage pipe(s). The water drainage pipes shall be on 24" or greater centers and their centers at least 12" away from either rib. Any high-density polyethylene, or similar, non-metallic material approved by the mine P.E., having an internal pressure rating of at least 240-psi would be acceptable for these pipes. No PVC or CPVC pipe allowed. Water valves and traps shall also have an internal pressure rating of at least 240-psi.

24. The inby end of all water-drainage pipes may have a horizontal "T" to minimize the inflow of debris into the pipe. The "T" is optional.

25. The location requirement for the water-drainage pipes is: Any two pipes and/or their water traps shall be spaced at least 2-feet on centers away from any other water pipe/water trap and at least 1-foot on center away from either rib. The water trap(s) may or may not be recessed into the mine floor. Note that the water trap does not have to be vertical as long as a water seal is achieved within the trap. In other words, it is possible to rotate the water trap so that the outby, mine floor does not have to be dug out. Orientation of trap shall assure water seal is maintained. The seal is designed for a maximum water height inby the seal of no more than 2-feet, but the inby invert of the water drainage pipe shall be not more than 12" from the mine floor. Additionally, the water drainage system pipes must be a minimum of 4" above the mine floor throughout the length of the pipe passing through the seal. However, the maximum distance between the invert of the inby end of the water drainage pipe and the mine floor as required by the MSHA District Manager in a mine's MSHA-approved sealing plan shall be followed in the construction of the seal. The mine shall ensure that no standing water can accumulate on the outby face of the seal as the entire outby face and outby perimeter of the seal is subjected to routine inspection by mine personnel.

26. A weir and trash screen system shall be constructed at the discretion of and as approved by the District Manager for the given seal location. Upstream of the inby, water-drainage pipe shall be a weir, which could be constructed by installing CMU glued together with Micon Seal PUR, whose flowline shall be equal to or higher than the elevation of the top of the inby, water drainage pipe.

(QUALITY CONTROL SAMPLES)

27. No more than 30 minutes before the start of each seal construction or no later than when each seal is 50% completed, MICON personnel would prepare at least (3) "beam" samples at the construction site. Samples shall be made with Hybribond that has originated from the application nozzle/mixer. Hybribond shall be deposited into a square form nominally 1.75" x 1.75" inside measurements x at least 5" long.

28. The "beam" test specimens shall be cured at their respective seal location where they were prepared for at least 1 hour before being sent for testing.

29. The collected quality-control "beam" samples shall be delivered to MICON, a testing laboratory, or a laboratory technician on site by either the mine operator or MICON personnel.

30. A technician, who had been trained and certified for the two-plane direct-shear test, shall conduct the tests on the "beam" specimens. These quality control tests shall be conducted at an ASTM member laboratory following the standard testing procedures.

31. Three (3), consecutive "beam" samples shall exhibit a minimum shear strength of 288-psi in a direct-shear test.

(RATIO TESTING – EVENT-DRIVEN REQUIREMENTS)

32. To assure PUR quality control throughout the seal, ratio testing of PUR components will be used as a secondary on-site confirmation. Ratio testing would be taken when one of the following events has occurred:

    a. Before the pump is used to construct a seal and at the beginning of each shift,
    b. Whenever a pump is stopped for 30 minutes or more,
    c. Whenever a new pump is introduced into construction,
    d. Whenever 25 feet or more of hose is added into the system,
    e. Whenever it is suspect that ratio might have changed for any reason, and/or
    f. Every 30 minutes of continuous pump operation.

33. Ratio tests require two test containers. Each container shall have 1-ounce graduation marks to 8 ounces or more, so that the final ratio can be visually verified by MICON personnel. After the pump is running, fill both containers simultaneously - one with the "A side" and one with the "B side" of PUR. Continue

filling the containers until at least one side's container reaches a minimum of 8 ounces. Verify that PUR in the containers do not vary by more than 1 ounce from one another. Ratio tests are to be documented on a standard MICON form at the time of collection.

34. When Micon Seal PUR is being pumped, the mixing wand shall be attended by a qualified installer, who shall be in close physical proximity and observe placement at all times while pumping.

35. A laboratory copy of the test results for each seal shall be given to the mine operator for transmittal to the MSHA District Office.

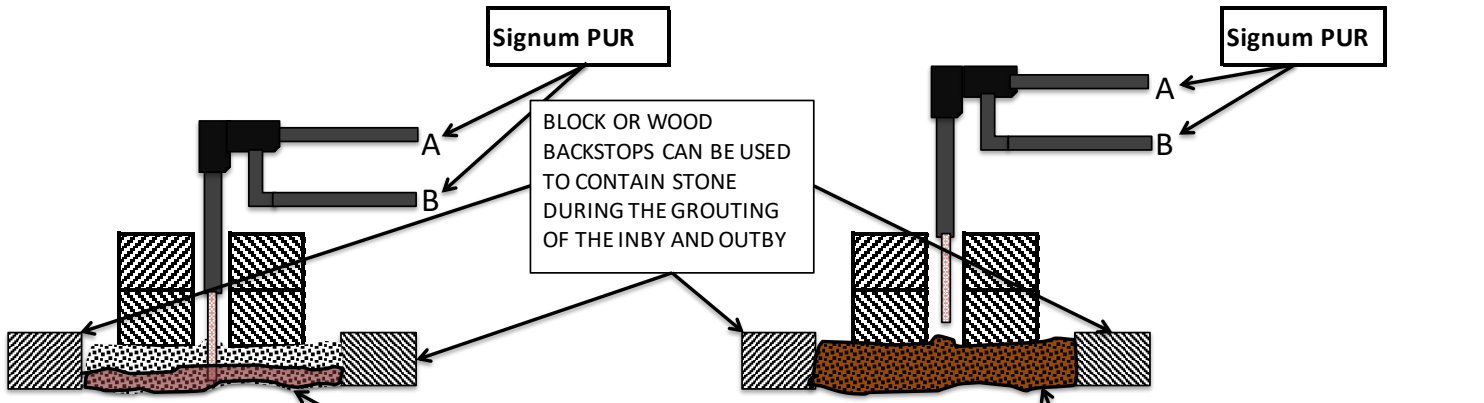
36. Each MICON HYBRID II seal construction shall not be considered to have reached its design strength, i.e., cannot be considered a seal, until a laboratory copy of tests results is received and acknowledged by the MSHA District Office.

CONSTRUCTION STEPS

37. Prepare the foundation for the seal. There are 3 options for the foundation preparation – gravel base, glue block directly to the floor, or a combination thereof:
    a. Glue block directly to competent floor strata. The foundation or a portion thereof may be the mine floor, to which CMU blocks shall be bonded using Signum.
    b. Gravel base. Lay a gravel base, in full or in increments. The maximum depth of the gravel shall be 4".
    c. The two techniques in "a" and "b" above may be combined.
    d. The foundation may be either flat or stepped in all three options.
    e. Using any size, solid CMU blocks, set the first horizontal course of blocks for footer on top of the gravel base or mine floor. Any number of wythes/rows set are acceptable. Wythes may be built from outby to inby, or inby to outby. If needed, one or more additional courses may be temporarily dry stacked on top of the first course for stability.
    f. When gravel is used, fully saturate the gravel with SIGNUM before permanently constructing the second course. Saturation is indicated by the visual return of SIGNUM on both sides of the individual block wythes up to the level of the bottom of the first course of block or higher. (See illustration on next page.)
    g. Unsaturated gravel or isolated voids at the perimeter of the foundation of the seal may be saturated with either Micon Seal PUR at any time before the seal is completed. Chinking may be employed as needed.

MICON HYBRID II SEAL GRAVEL FOOTER FILLING RECOMMENDATIONS

SIDE VIEW



STEP 1 LAY GRAVEL FOOTER.
SIGNUM PUR MAY BE APPLIED TOPICALLY
TO GRAVEL UP TO 2" DEEP, ENSURING SATURATION.
TO ACHIEVE FULL SATURATION FOR GRAVEL DEEPER THAN 2",
JAM WAND MIXER THROUGH LOOSE GRAVEL TO NEAR
MINE FLOOR TO ENSURE SIGNUM PUR LIQUID MAKES CONTACT WITH MINE FLOOR.

STEP 2 GRAVEL FOOTER COMPLETE FILL
COMPLETE THE GRAVEL SATURATION TO THE
BOTTOM OF EACH BLOCK IN EACH WYTHE RIB TO RIB

38. After the first course of CMU block is laid, glued to the foundation material, and/or any gravel saturated, construct subsequent courses of each wythe. Use SIGNUM to grout the abutting faces of the CMU together using any height, solid CMU blocks. Construct as many wythes as needed to achieve the minimum seal thickness specified in the seal thickness chart.
    a. The CMU wythe shall be a nominal 7-¼" to a maximum 16" thick depth inby to outby.
    b. Individual, partial CMU pieces less than 7-¼" in width can be used against the ribs and mine roof, as well as around objects penetrating the seal (such as pipes), to accommodate the undulating surfaces.
    c. The SIGNUM coverage of any abutting CMU block surface shall be at least 75%.
    d. Interior chinking can be installed between CMUs (including horizontal & vertical joints, or between wythes), used as a permanent means to contain PUR until it cures and/or utilized to compensate for irregularities in CMU geometry. Interior chinking can be placed either before or after CMU block placement, and shall be fully saturated with Micon Seal PUR.
    e. Any filling or chinking within 2" of either seal face is outside the structural zone of the seal body. Chinking and fill materials placed within this 2" non-structural zone do not have to be fully saturated with Micon PUR. Filling or chinking of the non-structural zones may occur before or after completion of the seal.
    f. A gap of minimum ¼" to maximum 2" thickness shall be maintained between adjacent CMU wythes.
    g. Wythes may be built from outby to inby, or inby to outby.
    h. The inby wythe may be built all the way to the roof before all other wythes, and is not subject to the 48" fill height criteria outlined in #40.

39. The maximum, polymer-filled gap between the end courses of CMU block and the rib shall be mostly 2" or less.
    a. Gaps (totaling no more than 10% of the height of the rib) per wythe greater than 2" can be tolerated.
    b. For localized gaps up to 4" wide, stemming or chinking may be employed using Micon Seal PUR, gravel, CMU pieces, untreated wood wedges, and/or chinking saturated with Micon PUR. Within the 2" nonstructural zone at the inby and outby faces, chinking does not have to be saturated, but only coated with Micon Seal PUR.
    c. The use of Micon Seal PUR-coated, untreated, wood wedges shall not exceed 5% of the rib contact area.
    d. Fully fill gaps between the seal and the rib.

40. Fully fill the gap between all adjacent, CMU wythes with SIGNUM or Hybribond.
    a. The gap shall be filled between two adjacent CMU wythes when the lower of the two wythes is 48" or less above any previously installed Micon Seal PUR in that gap.
    b. Incidental overrun of Hybribond onto the wythes may be scraped or removed before additional construction occurs.
    c. The gap between the two outer most wythes can be a minimum ¼" to a maximum 4" thickness.
    d. Because any gap/void in the vertical or horizontal seams of the interior CMU wythes, beyond the 75% coverage achieved during wythe construction, is adequately filled with Micon Seal PUR, no further filling of these possible gaps/voids/incompletely-filled seams is required after the completion of each interior wythe.
    e. No further filling beyond 75% criteria outlined in #38c is required.

41. Top off the seal. Fully fill the gaps between the top of the wythes and the mine roof with Micon Seal PUR, chinking, gravel and/or untreated, wood wedges.
    a. No more than 4 wythes/3 gaps, and 2 feet in height may be filled at one time during the topping off process.
    b. The maximum, polymer-filled gap between the top of individual wythes and the mine roof shall be mostly 4" or less. Gaps between the wythes and roof greater than 4" can be tolerated, provided gaps total no more than 10% of the width of the mine opening per wythe. (ex. 20-foot wide seal = up to 24" of gaps exceeding 4" allowed per wythe)
    c. Stemming or chinking may be employed for topping off using Micon Seal PUR, gravel, CMU pieces, untreated wood wedges, and/or chinking saturated with Micon PUR. Within the 2" nonstructural zone at the inby and outby faces, chinking does not have to be saturated, but only coated with Micon Seal PUR.
    d. The use of Micon Seal PUR-coated, untreated wood wedges shall not exceed 5% of the roof contact area.
    e. Fully fill gaps between the seal and the roof.

42. During construction, ensure the seal is in contact with strata around all four sides of the seal. If voids or loss of contact are observed, they must be filled. Filling may be achieved with a mixing wand or jam-rodding with Hybribond, Signum, Micon 70, Micon WC, etc. Voids may also be filled with gravel, CMU pieces, untreated wood wedges, and/or chinking. Any materials inserted deeper than 2" from the face of the seal must be saturated with Micon Seal PUR. Any materials less than 2" from the seal faces need only be coated with Micon Seal PUR.

43. There are many acceptable sequences and combinations to build seals.
    a. The seal can be built in a phased approach. Acceptable methods include but are not limited to: construct several wythes to the top then construct subsequent wythes; partially construct wythes at level heights; and/or "stair step" wythes. More than one of these methods may be utilized in an individual seal.
    b. The foundation and seal wythes above may be built in increments.
    c. Chinking can be utilized at any step of the construction process.

44. Mine personnel shall be responsible for assuring that the appropriate sampling, water, water-monitoring, etc. pipes through the seal are installed as specified in the mine's MSHA-approved ventilation/sealing plan.

45. To accommodate the sampling/water/water-monitoring pipes,
    a. All voids should be filled between the pipes/tubes and the CMU block throughout the seal's thickness.
    b. CMU pieces, gravel, chinking, untreated wood wedges and/or Micon Seal PUR may be employed to fill around pipes.
    c. These criteria also apply to any other object that penetrates the seal.

46. There will be occurrences when a window or opening must be left through the seal for ventilation or other purposes during construction, or across the entire width of the seal.
    a. Windows or openings may be located adjacent to ribs or in the middle of the seal.
    b. Partial wythes may be constructed to create such openings. Saturated chinking material can be inserted in gaps between partial wythes to enable filling them with Micon Seal PUR.
    c. Both constructing partial wythes and closing windows are subject to the same criteria as full wythes.

47. If leakage is ever detected around the seal-strata interface after seal construction, the suspect portions of the surrounding strata shall be grouted only by MICON via jam-rodding, ring grouting, and/or other MICON grouting techniques with Hybribond, Signum, MICON-70, Micon WC, etc.
    a. Access to the interface for above mentioned techniques is gained via penetration into the strata with a lancing tool, then injected with Hybribond, Signum, MICON-70, Micon WC, etc. until return or refusal.
    b. The use of non-MICON, grouting material in and/or around the Hybrid II seal shall not be used as said material could compromise the integrity of the Hybrid II seal.

48. Isolated open joints up to 7-¼" are allowable in up to 5% of the seal's total vertical joints (ex. A 7-feet x 20-feet seal has approximately 160 vertical joints. Eight would be allowed to remain up to 100% open). Cracks/voids/open joints in the seal's outby face are non-structural, and may be filled with Micon Seal PUR and/or coated chinking by a MICON technician during or after completion of the seal. CMU joints on inby and outby wythes can be filled at any time before, during or after seal completion.

49. The inby and/or outby faces of the MICON Hybrid II seal may be covered with Micon Seal PUR and/or an MSHA-approved sealant, but only after the District Manager's acknowledgement of seal completion by mine management. Heavy overflow, leakage and drippings of Micon Seal PUR onto the faces of the seal will often occur during the normal course of construction; this is not considered coating of the seal faces.

ADDITIONAL QUALITY CONTROL DETAILS

50. No quality control/assurance samples are required to be taken underground and subsequently tested other than the QC samples specified in #27 of MATERIALS, SITE PREPARATION, AND QUALITY CONTROL.

51. In situations where the mine operator purchases the CMU blocks, MICON shall provide the mine operator a list of MICON-sanctioned, suppliers for the CMU. MICON shall not install the MICON Hybrid II seal unless the CMU has been supplied by a MICON-sanctioned, block manufacturer.

52. When the mine provides the CMU block, MICON requires the mine to supply to MSHA the MICON-sanctioned block manufacturer's "mill sheet", which documents that the quality control samples from the manufactured lot of the CMU have been tested as per ASTM C-140 showing that the CMU's compressive strength is at least 1,800-psi.

53. The sealed containers of the Micon Seal PUR components shall be quality-controlled by the supplier. MICON shall notify Mine Emergency Operations (MEO) whenever they have either an additional supplier or a replacement supplier.

54. Any time a pump is determined to be defective and must be changed out, a ratio test would be performed before the replacement pump could be used for seal construction. The following are considered maintenance items and do not constitute a "bad pump": cleaning out suction hose filters, blocked fittings, bad hose, pump filters, etc.

55. Non-structural repairs or modifications are allowed once the MSHA District Manager receives the QC tests. If a problem with the seal is suspected or found, before or after the seal is certified, or any other issue relating to a Micon seal arises, MSHA Technical Support Mine Emergency Operations (MEO) should be contacted to provide guidance. MICON's structural engineer should also be consulted for his/her opinion on what, if any, remediation is either possible or necessary to ensure the seal meets its required design strength. The seal's design engineer can certify his/her professional opinion on what repair or modification could be allowed. The MICON engineer's professional opinion would be submitted for consideration and approval.

CONVERGENCE MEASUREMENTS

56. A convergence measurement between the mine roof and floor shall be taken in accordance with the mine-specific ventilation plan.

57. To measure convergence, options are:
    a. A permanently placed "pogo" stick or extensometer may be placed between the mine roof and floor to record compression of the body of the seal.
    b. Pins, dowels or equal permanently fixed in the face of the seal on or about the centerline of the outby face of the seal – one at or within 4" of the mine roof and the other at or within 4" of the mine floor – for use by a professional engineer in assessing the seal's integrity should the outby, roof-to-floor convergence measurement of the mine roof and floor exceed the maximum, allowable convergence specified.
    c. If option "b" above is selected, an extensometer may be placed between the two pins at the outby face of the seal.

58. If a roof-to-floor convergence measurement exceeds the maximum, allowable convergence specified, a top-to-bottom convergence measurement of the outby face of the seal exceeds 3% of the height of the seal, and/or the outby, CMU block wythes/walls shows signs of cracking, the mine operator shall notify the governing MSHA District Office and MICON within 24 hours of discovery. The MICON Hybrid II seal is designed to remain elastic in conditions when top-to-bottom, vertical compression of the seal itself is as high as 3%. Once the vertical compression of the seal exceeds 3%, the seal shall be evaluated by MICON's Professional Engineer (P.E.), and the governing MSHA District Office shall be supplied with certification of the seal's condition and structural integrity.

59. If MICON determines that the vertical compression of the seal and/or the floor-to-roof, convergence might have compromised the seal's strength, MICON's Professional Engineer (P.E.) must be contacted immediately to evaluate the effects of this vertical compression of the seal and/or the floor-to-roof, convergence, certify the structural integrity of the seal, and provide that certification to the MSHA District Office.

Appendix A – Thickness Tables

MSHA Approval Number: 120M-11.4
120 psi MICON Main Line Hybrid II Seal
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120-psi, MICON Hybrid II, Mainline Seal
Minimum Thickness Chart

Pressure	D.L.F.	L.F.	Height	Width	Min Thick	Max Convergence
(psi)	(#)	(#)	(ft)	(ft)	(in)	(in)
120	2	1.5	4	18	30.3	1.44
120	2	1.5	4	19	30.3	1.44
120	2	1.5	4	20	30.3	1.44
120	2	1.5	4	21	30.3	1.44
120	2	1.5	4	22	30.3	1.44
120	2	1.5	4	23	30.3	1.44
120	2	1.5	4	24	30.3	1.44
120	2	1.5	4	25	30.3	1.44
120	2	1.5	4	26	30.3	1.44
120	2	1.5	4	27	30.3	1.44
120	2	1.5	4	28	30.3	1.44
120	2	1.5	4.25	18	31.9	1.53
120	2	1.5	4.25	19	31.9	1.53
120	2	1.5	4.25	20	31.9	1.53
120	2	1.5	4.25	21	31.9	1.53
120	2	1.5	4.25	22	31.9	1.53
120	2	1.5	4.25	23	31.9	1.53
120	2	1.5	4.25	24	31.9	1.53
120	2	1.5	4.25	25	31.9	1.53
120	2	1.5	4.25	26	31.9	1.53
120	2	1.5	4.25	27	31.9	1.53
120	2	1.5	4.25	28	31.9	1.53
120	2	1.5	4.5	18	33.5	1.62
120	2	1.5	4.5	19	33.5	1.62
120	2	1.5	4.5	20	33.5	1.62
120	2	1.5	4.5	21	33.5	1.62
120	2	1.5	4.5	22	33.5	1.62
120	2	1.5	4.5	23	33.5	1.62
120	2	1.5	4.5	24	33.5	1.62
120	2	1.5	4.5	25	33.5	1.62
120	2	1.5	4.5	26	33.5	1.62
120	2	1.5	4.5	27	33.5	1.62
120	2	1.5	4.5	28	33.5	1.62

120	2	1.5	4.75	18	35.2	1.71
120	2	1.5	4.75	19	35.2	1.71
120	2	1.5	4.75	20	35.2	1.71
120	2	1.5	4.75	21	35.2	1.71
120	2	1.5	4.75	22	35.2	1.71
120	2	1.5	4.75	23	35.2	1.71
120	2	1.5	4.75	24	35.2	1.71
120	2	1.5	4.75	25	35.2	1.71
120	2	1.5	4.75	26	35.2	1.71
120	2	1.5	4.75	27	35.2	1.71
120	2	1.5	4.75	28	35.2	1.71
120	2	1.5	5	18	36.8	1.80
120	2	1.5	5	19	36.8	1.80
120	2	1.5	5	20	36.8	1.80
120	2	1.5	5	21	36.8	1.80
120	2	1.5	5	22	36.8	1.80
120	2	1.5	5	23	36.8	1.80
120	2	1.5	5	24	36.8	1.80
120	2	1.5	5	25	36.8	1.80
120	2	1.5	5	26	36.8	1.80
120	2	1.5	5	27	36.8	1.80
120	2	1.5	5	28	36.8	1.80
120	2	1.5	5.25	18	38.5	1.89
120	2	1.5	5.25	19	38.5	1.89
120	2	1.5	5.25	20	38.5	1.89
120	2	1.5	5.25	21	38.5	1.89
120	2	1.5	5.25	22	38.5	1.89
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120	2	1.5	5.25	24	38.5	1.89
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120	2	1.5	5.5	18	40.1	1.98
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120	2	1.5	5.5	24	40.1	1.98
120	2	1.5	5.5	25	40.1	1.98
120	2	1.5	5.5	26	40.1	1.98

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120	2	1.5	5.75	19	41.7	2.07
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120	2	1.5	6	23	43.4	2.16
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120	2	1.5	12	23	82.6	4.32
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120	2	1.5	13.5	19	86.9	4.86
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120	2	1.5	13.5	22	90.6	4.86
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120	2	1.5	14	18	86.9	5.04
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120	2	1.5	14	23	93.9	5.04
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120	2	1.5	15	23	98.7	5.40
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120	2	1.5	16	27	107.3	5.76
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120	2	1.5	16.75	28	112.0	6.03
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120	2	1.5	19	19	102.6	6.84
120	2	1.5	19	20	105.7	6.84

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120	2	1.5	19	23	113.5	6.84
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120	2	1.5	19	25	117.6	6.84
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120	2	1.5	20	28	126.5	7.20
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120	2	1.5	20.25	19	106.4	7.29
120	2	1.5	20.25	20	108.5	7.29
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120	2	1.5	20.75	27	127.5	7.47

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120	2	1.5	21	21	112.9	7.56
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120	2	1.5	21	28	130.3	7.56
120	2	1.5	21.25	18	106.5	7.65
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120	2	1.5	21.5	28	132.0	7.74
120	2	1.5	21.75	18	107.6	7.83
120	2	1.5	21.75	19	110.5	7.83
120	2	1.5	21.75	20	113.0	7.83
120	2	1.5	21.75	21	115.3	7.83
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120	2	1.5	21.75	23	120.7	7.83
120	2	1.5	21.75	24	123.5	7.83
120	2	1.5	21.75	25	126.1	7.83

120	2	1.5	21.75	26	128.6	7.83
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120	2	1.5	21.75	28	132.9	7.83
120	2	1.5	22	18	108.2	7.92
120	2	1.5	22	19	111.1	7.92
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120	2	1.5	22	22	118.1	7.92
120	2	1.5	22	23	121.2	7.92
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120	2	1.5	23	23	123.3	8.28
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120	2	1.5	23.25	20	117.0	8.37
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120	2	1.5	23.75	20	118.2	8.55
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120	2	1.5	24.75	18	113.6	8.91
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120	2	1.5	24.75	24	130.9	8.91
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120	2	1.5	25	23	129.3	9.00
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120	2	1.5	26	19	119.4	9.36
120	2	1.5	26	20	123.0	9.36
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120	2	1.5	26.75	18	116.5	9.63
120	2	1.5	26.75	19	120.7	9.63
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120	2	1.5	27	23	134.6	9.72
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120	2	1.5	30	25	147.5	10.80
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120	2	1.5	30.25	21	134.0	10.89
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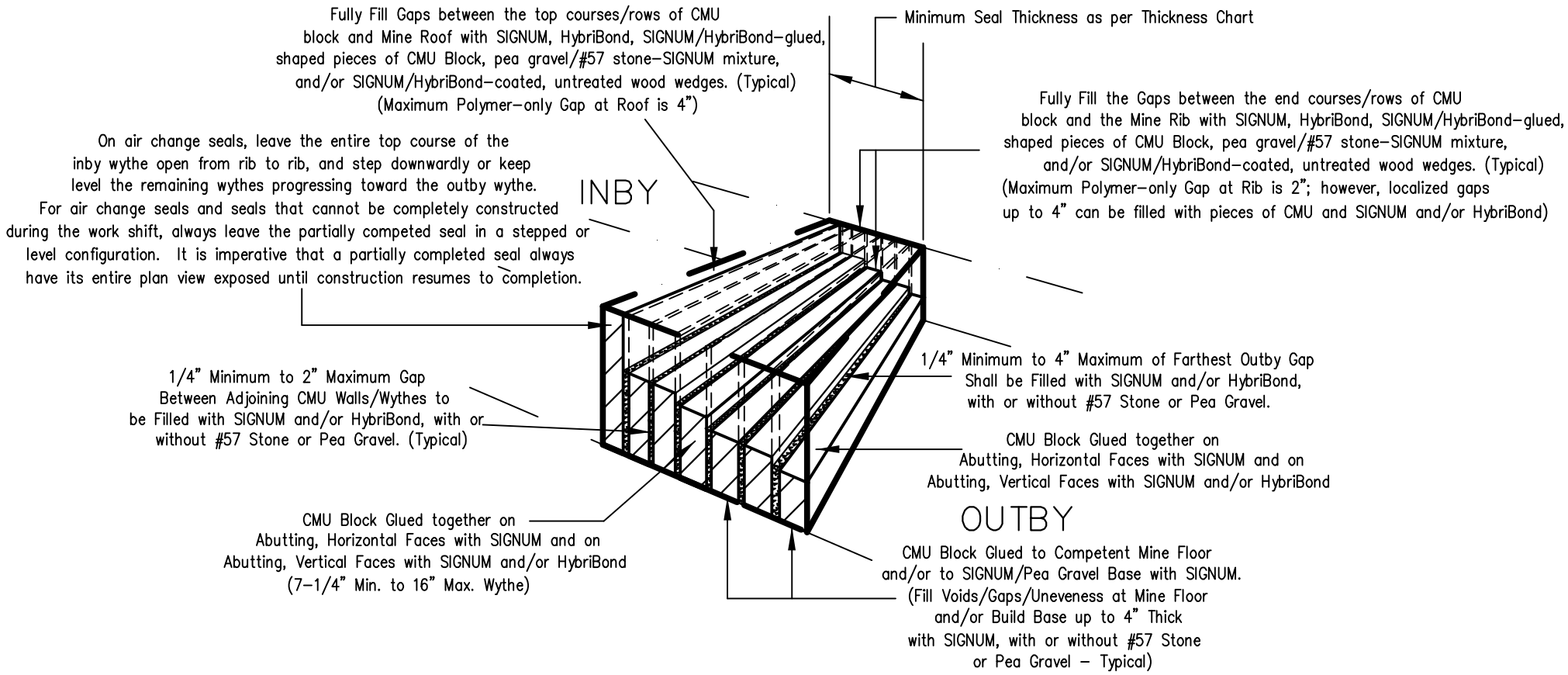
120	2	1.5	30.25	27	153.6	10.89
120	2	1.5	30.25	28	156.1	10.89
120	2	1.5	30.5	18	120.3	10.98
120	2	1.5	30.5	19	125.4	10.98
120	2	1.5	30.5	20	130.0	10.98
120	2	1.5	30.5	21	134.3	10.98
120	2	1.5	30.5	22	138.3	10.98
120	2	1.5	30.5	23	142.0	10.98
120	2	1.5	30.5	24	145.4	10.98
120	2	1.5	30.5	25	148.6	10.98
120	2	1.5	30.5	26	151.5	10.98
120	2	1.5	30.5	27	154.3	10.98
120	2	1.5	30.5	28	156.8	10.98
120	2	1.5	30.75	18	120.5	11.07
120	2	1.5	30.75	19	125.6	11.07
120	2	1.5	30.75	20	130.3	11.07
120	2	1.5	30.75	21	134.7	11.07
120	2	1.5	30.75	22	138.7	11.07
120	2	1.5	30.75	23	142.5	11.07
120	2	1.5	30.75	24	145.9	11.07
120	2	1.5	30.75	25	149.1	11.07
120	2	1.5	30.75	26	152.1	11.07
120	2	1.5	30.75	27	154.9	11.07
120	2	1.5	30.75	28	157.5	11.07
120	2	1.5	31	18	120.7	11.16

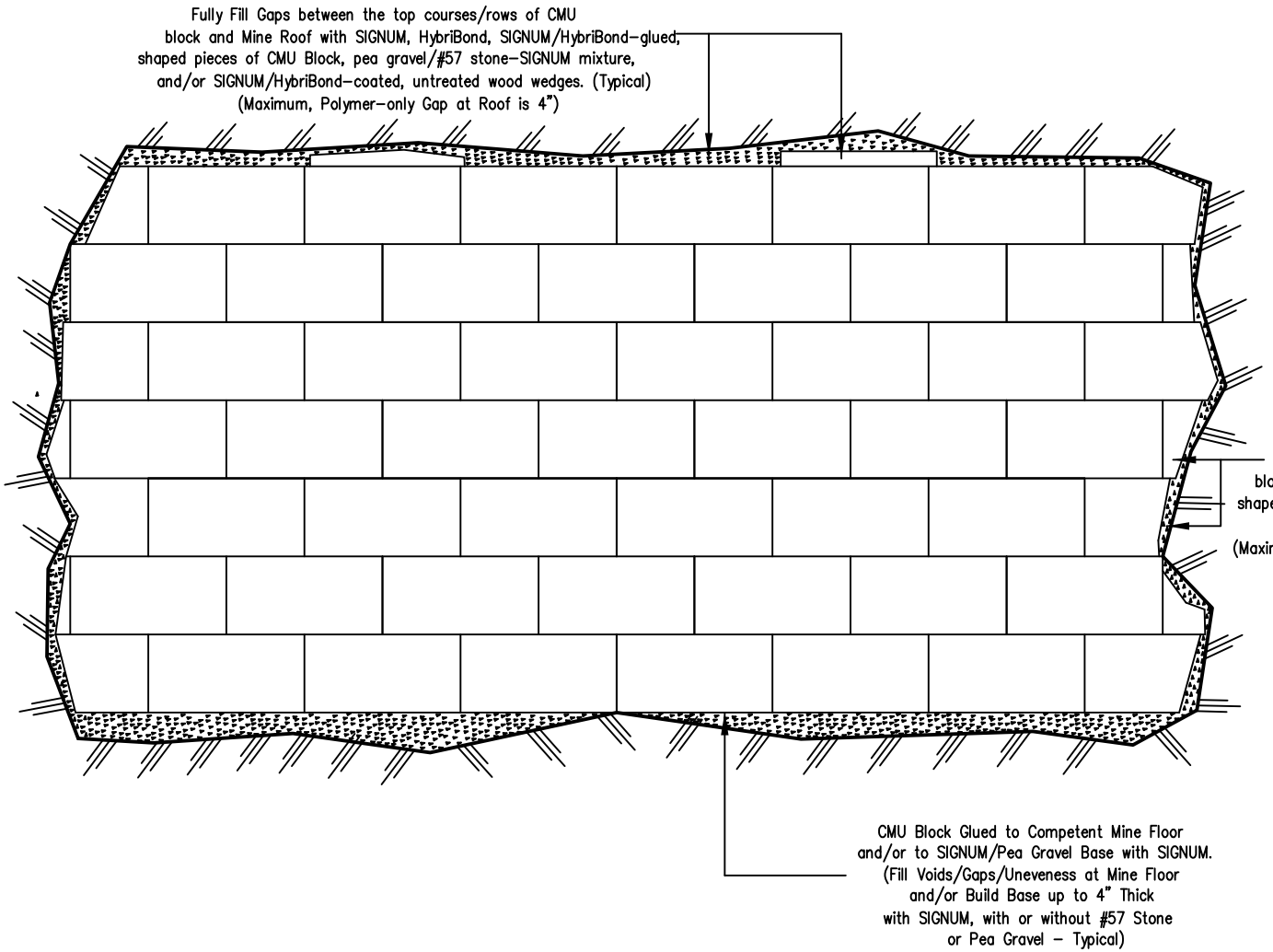
120	2	1.5	31	19	125.8	11.16
120	2	1.5	31	20	130.6	11.16
120	2	1.5	31	21	135.0	11.16
120	2	1.5	31	22	139.1	11.16
120	2	1.5	31	23	142.9	11.16
120	2	1.5	31	24	146.4	11.16
120	2	1.5	31	25	149.7	11.16
120	2	1.5	31	26	152.7	11.16
120	2	1.5	31	27	155.5	11.16
120	2	1.5	31	28	158.1	11.16
120	2	1.5	31.25	18	120.8	11.25
120	2	1.5	31.25	19	126.1	11.25
120	2	1.5	31.25	20	130.9	11.25
120	2	1.5	31.25	21	135.4	11.25
120	2	1.5	31.25	22	139.5	11.25
120	2	1.5	31.25	23	143.3	11.25
120	2	1.5	31.25	24	146.9	11.25
120	2	1.5	31.25	25	150.2	11.25
120	2	1.5	31.25	26	153.3	11.25
120	2	1.5	31.25	27	156.2	11.25
120	2	1.5	31.25	28	158.8	11.25
120	2	1.5	31.5	18	121.0	11.34
120	2	1.5	31.5	19	126.3	11.34
120	2	1.5	31.5	20	131.2	11.34
120	2	1.5	31.5	21	135.7	11.34
120	2	1.5	31.5	22	139.9	11.34
120	2	1.5	31.5	23	143.8	11.34
120	2	1.5	31.5	24	147.4	11.34
120	2	1.5	31.5	25	150.8	11.34
120	2	1.5	31.5	26	153.9	11.34
120	2	1.5	31.5	27	156.8	11.34
120	2	1.5	31.5	28	159.5	11.34
120	2	1.5	31.75	18	121.1	11.43
120	2	1.5	31.75	19	126.5	11.43
120	2	1.5	31.75	20	131.4	11.43
120	2	1.5	31.75	21	136.0	11.43
120	2	1.5	31.75	22	140.2	11.43
120	2	1.5	31.75	23	144.2	11.43
120	2	1.5	31.75	24	147.9	11.43
120	2	1.5	31.75	25	151.3	11.43
120	2	1.5	31.75	26	154.4	11.43
120	2	1.5	31.75	27	157.4	11.43

120	2	1.5	31.75	28	160.1	11.43
120	2	1.5	32	18	121.2	11.52
120	2	1.5	32	19	126.7	11.52
120	2	1.5	32	20	131.7	11.52
120	2	1.5	32	21	136.3	11.52
120	2	1.5	32	22	140.6	11.52
120	2	1.5	32	23	144.6	11.52
120	2	1.5	32	24	148.3	11.52
120	2	1.5	32	25	151.8	11.52
120	2	1.5	32	26	155.0	11.52
120	2	1.5	32	27	158.0	11.52
120	2	1.5	32	28	160.8	11.52
120	2	1.5	32.25	18	121.4	11.61
120	2	1.5	32.25	19	126.8	11.61
120	2	1.5	32.25	20	131.9	11.61
120	2	1.5	32.25	21	136.6	11.61
120	2	1.5	32.25	22	141.0	11.61
120	2	1.5	32.25	23	145.0	11.61
120	2	1.5	32.25	24	148.8	11.61
120	2	1.5	32.25	25	152.3	11.61
120	2	1.5	32.25	26	155.5	11.61
120	2	1.5	32.25	27	158.6	11.61
120	2	1.5	32.25	28	161.4	11.61
120	2	1.5	32.5	18	121.5	11.70
120	2	1.5	32.5	19	127.0	11.70
120	2	1.5	32.5	20	132.1	11.70
120	2	1.5	32.5	21	136.9	11.70
120	2	1.5	32.5	22	141.3	11.70
120	2	1.5	32.5	23	145.4	11.70
120	2	1.5	32.5	24	149.2	11.70
120	2	1.5	32.5	25	152.8	11.70
120	2	1.5	32.5	26	156.1	11.70
120	2	1.5	32.5	27	159.2	11.70
120	2	1.5	32.5	28	162.0	11.70

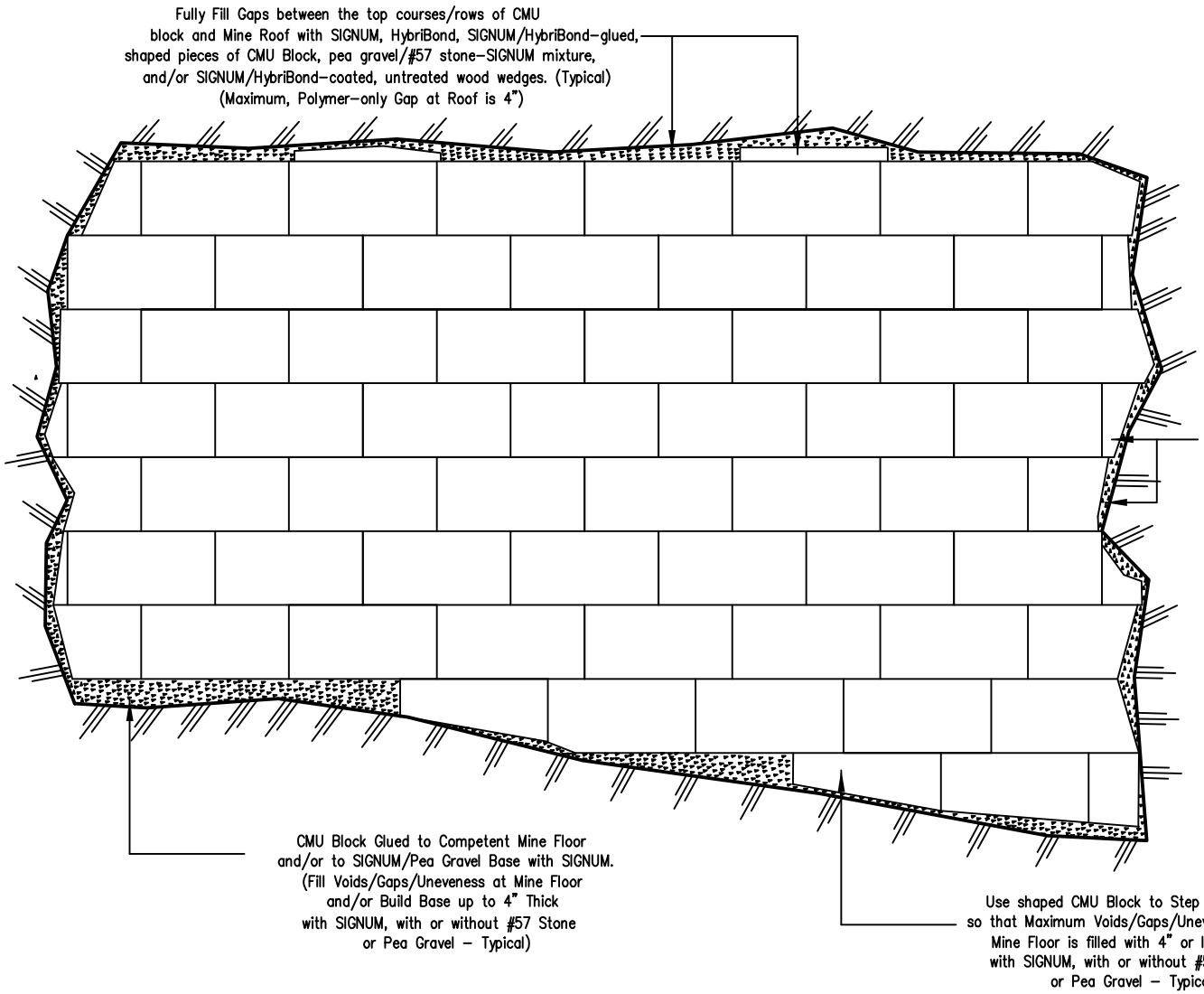
Appendix B – Typical Construction Drawings



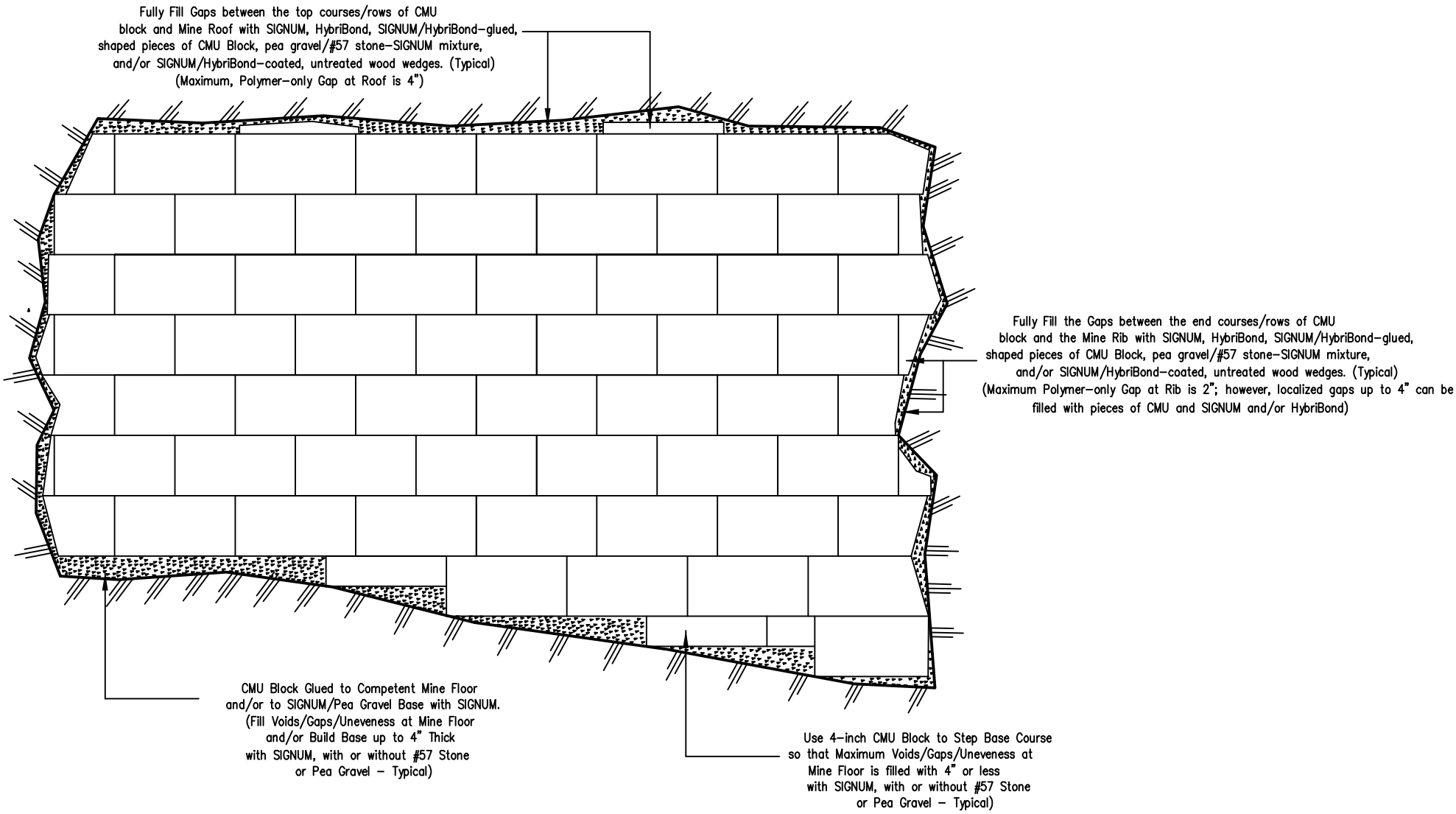
TYPICAL, ISOMETRIC VIEW OF MICON, HYBRID II SEAL DURING AND AFTER ITS CONSTRUCTION (N.T.S.)



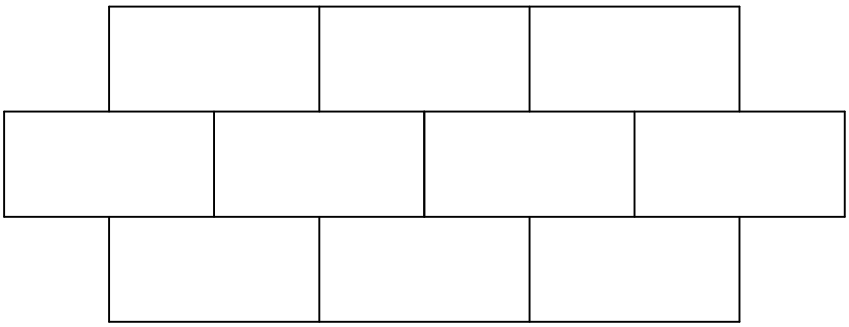
TYPICAL OUTBY ELEVATION VIEW OF 120–psi, Hybrid II SEAL (N.T.S.)



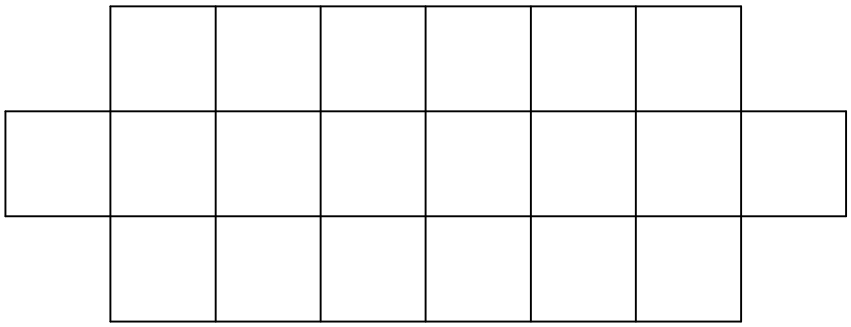
TYPICAL OUTBY ELEVATION VIEW OF 120–psi, Hybrid II SEAL WITH FLOOR SLOPING FROM RIB TO RIB (N.T.S.)



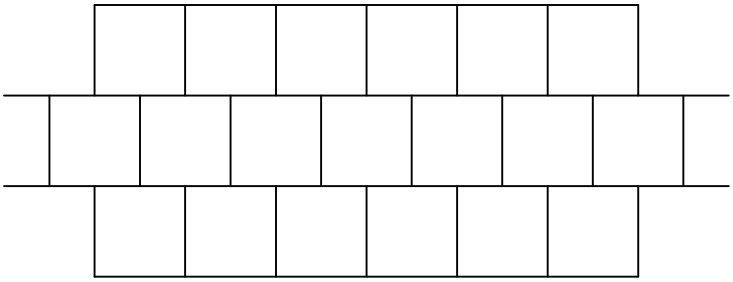
TYPICAL OUTBY ELEVATION VIEW OF 120–psi, Hybrid II SEAL
WITH FLOOR SLOPING FROM RIB TO RIB (N.T.S.)



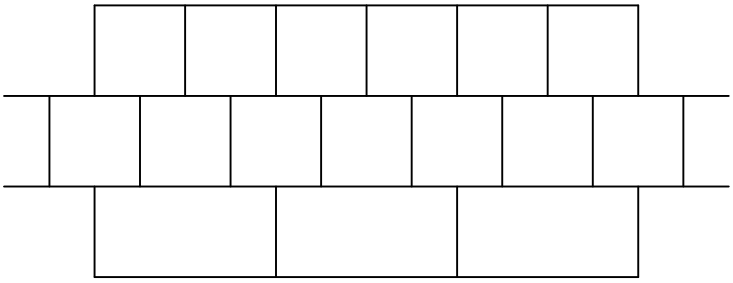
TYPICAL RUNNING BOND WYTHE – 7–1/4" Min. to 16" Max. THICK
(N.T.S.)



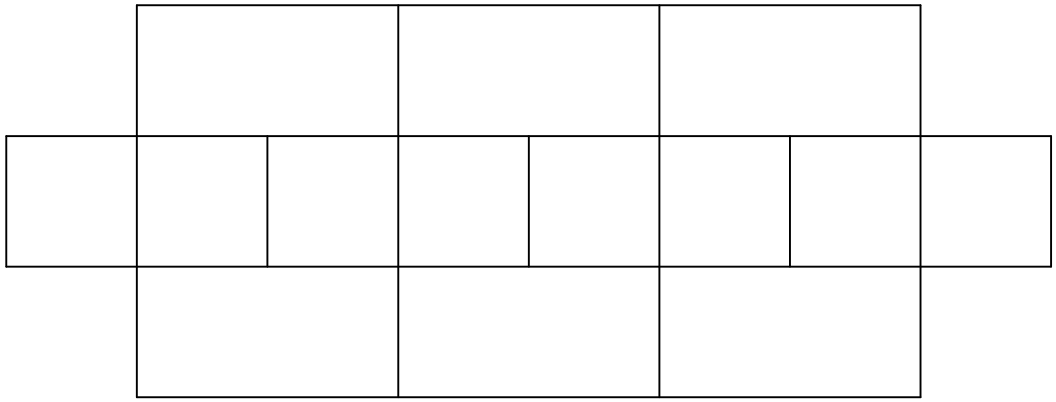
TYPICAL STACK BOND WYTHE – 7–1/4" Min. to 16" Max. THICK
(N.T.S.)



TYPICAL RUNNING BOND WYTHE – 7–1/4" Min. to 16" Max. THICK
(N.T.S.)



TYPICAL COMMON/RUNNING BOND WYTHE – 7–1/4" Min. to 16" Max. THICK
(N.T.S.)



TYPICAL COMMON/STACK BOND WYTHE – 7–1/4" Min. to 16" Max. THICK
(N.T.S.)