

## **FUSION<sup>®</sup> AGRICULTURAL SLURRY TANKS**

<b>Designer and Manufacturer:</b>	Fusion <sup>®</sup> Tanks and Silos Eye Suffolk IP23 7HS England
<b>Model Numbers and Sizes:</b>	Model Reference Numbers and structure sizes are contained in the attached tables.
<b>Drawings and Installation Manual:</b>	The construction drawings are proprietary and not for distribution. The drawings will be available on site. The <u>Agricultural Products Slurry Tank Construction Guide</u> , 32 pages, dated April 28, 2000 will also be available on site.
<b>Materials:</b>	The structure shell consists of glass fused to steel sheets that are bolted together. Footing walls and the floor slab are reinforced concrete. Cathodic protection is required on all installations. <ul style="list-style-type: none"><li>• 4000 psi concrete</li><li>• Maximum water-cement ratio of 0.46</li><li>• Grade 60 steel reinforcement</li><li>• Expanding waterstop on the sheet or starter ring embedded in the concrete footer.</li></ul>
<b>Design Assumptions:</b>	<ul style="list-style-type: none"><li>• The steel sheet design is for above ground application only (no backfill).</li><li>• Cathodic protection requirements are 1 (one) anode per 20 structure sheets.</li><li>• The concrete floor slab reinforcement will be determined by the installer based on the tank diameter to be constructed. Most slabs will be reinforced to allow a monolithic pour.</li><li>• The minimum required foundation soil bearing capacity is 3000 lbs./sq. ft.</li></ul>
<b>Review and Acceptance:</b>	An independent review of the structure design was performed by Baisch Engineering of Kaukauna, Wisconsin. They determined the design met the structural design requirements of NRCS Standard 313.  The State Conservation Engineer in Wisconsin accepted the independent engineering review and revisions to the construction guide for compliance with Wisconsin NRCS Standard 313.



**NRCS MODELS**

Nominal Diameter (ft)	Actual Diameter (ft)	MODEL HEIGHT REF				
		2 rings 9ft 2in	3 rings 13ft 9in	4 rings 18ft 4in	5 rings 23ft	6 rings 27ft 7in
		<b>MODEL REFERENCE</b>				
20	19.61	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
22	22.41	<b>2210</b>	<b>2215</b>	<b>2220</b>	<b>2225</b>	<b>2230</b>
25	25.21	<b>2510</b>	<b>2515</b>	<b>2520</b>	<b>2525</b>	<b>2530</b>
28	28.02	<b>2810</b>	<b>2815</b>	<b>2820</b>	<b>2825</b>	<b>2830</b>
31	30.82	<b>3110</b>	<b>3115</b>	<b>3120</b>	<b>3125</b>	<b>3130</b>
34	33.62	<b>3410</b>	<b>3415</b>	<b>3420</b>	<b>3425</b>	<b>3430</b>
36	36.42	<b>3610</b>	<b>3615</b>	<b>3620</b>	<b>3625</b>	<b>3630</b>
39	39.22	<b>3910</b>	<b>3915</b>	<b>3920</b>	<b>3925</b>	<b>3930</b>
42	42.02	<b>4210</b>	<b>4215</b>	<b>4220</b>	<b>4225</b>	<b>4230</b>
45	44.83	<b>4510</b>	<b>4515</b>	<b>4520</b>	<b>4525</b>	<b>4530</b>
48	47.63	<b>4810</b>	<b>4815</b>	<b>4820</b>	<b>4825</b>	<b>4830</b>
50	50.43	<b>5010</b>	<b>5015</b>	<b>5020</b>	<b>5025</b>	<b>5030</b>
53	53.23	<b>5310</b>	<b>5315</b>	<b>5320</b>	<b>5325</b>	<b>5330</b>
56	56.03	<b>5610</b>	<b>5615</b>	<b>5620</b>	<b>5625</b>	<b>5630</b>
59	58.83	<b>5910</b>	<b>5915</b>	<b>5920</b>	<b>5925</b>	<b>5930</b>
62	61.63	<b>6210</b>	<b>6215</b>	<b>6220</b>	<b>6225</b>	<b>6230</b>
64	64.44	<b>6410</b>	<b>6415</b>	<b>6420</b>	<b>6425</b>	<b>6430</b>
67	67.24	<b>6710</b>	<b>6715</b>	<b>6720</b>	<b>6725</b>	<b>6730</b>
70	70.04	<b>7010</b>	<b>7015</b>	<b>7020</b>	<b>7025</b>	<b>7030</b>
73	72.84	<b>7310</b>	<b>7315</b>	<b>7320</b>	<b>7325</b>	<b>7330</b>
76	75.64	<b>7610</b>	<b>7615</b>	<b>7620</b>	<b>7625</b>	<b>7630</b>
78	78.44	<b>7810</b>	<b>7815</b>	<b>7820</b>	<b>7825</b>	<b>7830</b>
81	81.25	<b>8110</b>	<b>8115</b>	<b>8120</b>	<b>8125</b>	<b>8130</b>
84	84.05	<b>8410</b>	<b>8415</b>	<b>8420</b>	<b>8425</b>	<b>8430</b>
87	86.85	<b>8710</b>	<b>8715</b>	<b>8720</b>	<b>8725</b>	<b>8730</b>
90	89.65	<b>9010</b>	<b>9015</b>	<b>9020</b>	<b>9025</b>	<b>9030</b>
92	92.45	<b>9210</b>	<b>9215</b>	<b>9220</b>	<b>9225</b>	<b>9230</b>
95	95.25	<b>9510</b>	<b>9515</b>	<b>9520</b>	<b>9525</b>	<b>9530</b>
98	98.06	<b>9810</b>	<b>9815</b>	<b>9820</b>	<b>9825</b>	<b>9830</b>
101	100.86	<b>10110</b>	<b>10115</b>	<b>10120</b>	<b>10125</b>	<b>10130</b>
104	103.66	<b>10410</b>	<b>10415</b>	<b>10420</b>	<b>10425</b>	<b>10430</b>
106	106.46	<b>10610</b>	<b>10615</b>	<b>10620</b>	<b>10625</b>	<b>10630</b>
109	109.26	<b>10910</b>	<b>10915</b>	<b>10920</b>	<b>10925</b>	<b>10930</b>

These tanks are available with a 9" starter ring or without, as shown above.



**NRCS MODELS**

Nominal Diameter (ft)	Actual Diameter (ft)	HEIGHT				
		2 rings 9ft 2in	3 rings 13ft 9in	4 rings 18ft 4in	5 rings 23ft	6 rings 27ft 7in
		<b>MODEL REFERENCE</b>				
112	112.06	11210	11215	11220	11225	11230
115	114.86	11510	11515	11520	11525	11530
118	117.67	11810	11815	11820	11825	11830
120	120.47	12010	12015	12020	12025	12030
123	123.27	12310	12315	12320	12325	12330
126	126.07	12610	12615	12620	12625	12630
129	128.87	12910	12915	12920	12925	12930
132	131.67	13210	13215	13220	13225	13230
134	134.48	13410	13415	13420	13425	13430
137	137.28	13710	13715	13720	13725	13730
140	140.08	14010	14015	14020	14025	***
143	142.88	14310	14315	14320	14325	***
146	145.68	14610	14615	14620	14625	***
148	148.48	14810	14815	14820	14825	***
151	151.29	15110	15115	15120	15125	***
154	154.09	15410	15415	15420	15425	***
157	156.89	15710	15715	15720	15725	***
160	159.69	16010	16015	16020	16025	***
162	162.49	16210	16215	16220	16225	***
165	165.29	16510	16515	16520	***	***
168	168.09	16810	16815	16820	***	***
171	170.90	17110	17115	17120	***	***
174	173.70	17410	17415	17420	***	***
176	176.50	17610	17615	17620	***	***
179	179.30	17910	17915	17920	***	***
182	182.10	18210	18215	18220	***	***
185	184.90	18510	18515	18520	***	***
188	187.71	18810	18815	18820	***	***
190	190.51	19010	19015	19020	***	***
193	193.31	19310	19315	19320	***	***
196	196.11	19610	19615	19620	***	***
199	198.91	19910	19915	19920	***	***
202	201.71	20210	20215	20220	***	***
205	204.51	20510	20515	20520	***	***
207	207.32	20710	20715	***	***	***
210	210.12	21010	21015	***	***	***

These tanks are available with a 9" starter ring or without, as shown above.



**NRCS MODELS**

Nominal Diameter (ft)	Actual Diameter (ft)	HEIGHT	
		2 rings 9ft 2in	3 rings 13ft 9in
		MODEL REFERENCE	
213	212.92	21310	21315
216	215.72	21610	21615
219	218.52	21910	21915
221	221.32	22110	22115
224	224.13	22410	22415
227	226.93	22710	22715
230	229.73	23010	23015
233	232.53	23310	23315
235	235.33	23510	23515
238	238.13	23810	23815
241	240.94	24110	24115
244	243.74	24410	24415
247	246.54	24710	24715
249	249.34	24910	24915
252	252.14	25210	25215
255	254.94	25510	25515
258	257.75	25810	25815
261	260.55	26110	26115
263	263.35	26310	26315
266	266.15	26610	26615
269	268.95	26910	26915
272	271.75	27210	27215
275	274.55	27510	27515
277	277.36	27710	***
280	280.16	28010	***

These tanks are available with a 9" starter ring or without, as shown above.

## WIESER'S PAN-L-BILT MANURE STORAGE FACILITY

**Owner and  
Manufacturer:**

Wieser Concrete Products, Inc.  
W3716 U. S. Highway 10  
Maiden Rock, Wisconsin 54750  
715/647-2311 Toll Free 800/325-8456

**Designer:**

Original designer:                      Addition features designer:  
Bernard J. Jahn, P. E.                      Michael J. Malson, P. E.  
Corcoran, Minnesota                      Mount Prospect, Illinois

Latest Standard 313 criteria designer:  
Greg A. Jewell, P. E.  
Spring Green, Wisconsin

**Drawings and  
Installation  
Manual:**

The construction drawings (43 pages) are in the document titled INSTALLATION MANUAL, PAN-L-BILT MANURE STORAGE FACILITY, April 9, 2001. The installation manual is signed and sealed by Joseph H. Marter, P.E. **Page 4 of the installation manual has a revised date of 1/24/05.**

**Materials:**

- Wall panels are 8 or 12 feet high precast ribbed panels with 5000 psi concrete and Grade 60 steel.
- The cover slats and supporting beams and columns are precast with 5000 psi concrete and Grade 60 steel.
- Wall panels are bolted together with 5/8 inch bolts and sealed with Con-Seal Butyl Resin Concrete Sealant.
- Floor slab and footings are site cast with a minimum 3500 psi concrete and Grade 60 steel.
- Site soils and backfill requirements and options are listed in the Installation Manual.

**Design  
Assumptions:**

The wall panels are designed for a full backfill, tank empty condition, and a tank full condition with backfill one foot below the top of the wall panel. Equivalent fluid pressures are 65 psf for the manure and 60 psf and 85 psf for the soil backfill. An equipment surcharge loading equal to two feet of backfill soil (120 or 170 psf) is provided. A complete listing of loadings is contained on page 2 of the Installation Manual Drawings.

The cover slats, free stall panels, drive through panels or pump out covers are required to support the wall panels. Slats or cover panels and cover opening options are contained in the manual.

See "Review and Acceptance" on the back of this page for additional site soil requirements.

**Review and Acceptance:**

An independent review of the structure design was performed by Jewell & Associates of Spring Green, Wisconsin. They determined the design met the structural design requirements of NRCS Standard 313.

The State Conservation Engineer in Wisconsin accepted the independent engineering review and revisions to the installation manual for compliance with the Wisconsin NRCS Standard 313.

**Conditions of Wisconsin Approval:**

A. Backfill

The structure panels must always be backfilled with soils that meet the minimum criteria in Table 5 (Concrete-Soil Composite).

B. Foundation soil/floor slab options

1. The in-place soils below the floor slab meet the criteria contained in Table 1 or 2 in Standard 313. The floor slab may be reinforced to handle the anticipated loadings. A sand/gravel base is allowed.
2. Foundation soils meet the criteria in Table 5, Concrete-Soil Composite, in Standard 313. The floor slab is reinforced with #3 bars at 18 inches each way and no control joints are required. The slab is poured directly onto the foundation soils. No sand/gravel base is allowed.
3. Foundation soils may be of any composition that provides adequate bearing capacity for the floor slab and panels. The floor slab is reinforced and control joints spaced per the subgrade drag theory computation. Joints must contain an imbedded non-metallic waterstop. A sand/gravel base is allowed.



**Assumptions:**

The following is a partial list of assumptions from the specification noted above.

1. The reconstructed unit is the same diameter and height as the original installation.
2. All parts previously set in concrete are replaced with new parts, equivalent to original equipment.
3. All hardware required for tank assembly will be new and equivalent in size and strength to original equipment.
4. The agitation and unloading system enters the structure through the floor slab.
5. A new cathodic protection system will be installed.
6. Concrete compressive strength will be 4000 psi.
7. Reinforcing bars will be Grade 60.
8. The starter ring is stainless steel, Type 304 with 0% cold reduction strength values of  $F_y=40,000$  psi and  $F_u=90,000$  psi.

**Review and Acceptance:**

An independent review of the structure was performed by Auth Consulting Associates. They determined the design met the structural design requirements of Natural Resources Conservation Service (NRCS) Standard 313.

The State Conservation Engineer in Wisconsin accepted the independent engineering review and revisions to the installation manual for compliance with Wisconsin NRCS Standard 313.

**HUFFCUTT CONCRETE**  
**PRECAST CONCRETE T-PANELS FOR MANURE STORAGE**  
**(8'-6", 10'-6" AND 12'-6" High)**

- Fabricator:** Huffcutt Concrete  
737 Herbert Street  
Chippewa Falls, WI 54729 (715) 723-7446
- Designer:** Gary K. Munkelt, P. E.  
Gary K. Munkelt & Associates  
Souderton, Pennsylvania
- Drawings and Installation Manual:** Gary K. Munkelt and Associates prepared a design, drawings and construction manual for precast concrete T-panels 8'-6", 10'-6", and 12'-6" in height. The design and drawing documents show a latest revision date of May 11, 2004. The construction manual is dated March 2003. The design for all three panel heights were sealed and signed by Gary K. Munkelt, P.E. and dated May 13, 2004.
- Materials:** The structure is precast concrete, 5000 psi, reinforced with Grade 40 steel and 65,000 psi welded wire fabric. The floor slab is 3500 psi concrete.
- The manure panels are bolted together with two layers of ¾"x1" Conseal CS-231 (or equivalent), controlled expansion sealant, placed between the units. Conseal CS-1500, elastomeric sealant (or equivalent) is applied to the inside and outside joint surface. A 12-inch wide Conseal CS-231 (or equivalent) will be installed at toe of each panel and extended 6 inches over the anchor bolt prior to pouring the concrete over the panel base.
- Two 5-foot wide closure panels are used to complete the structure perimeter. A waterstop and horizontal reinforcing bars are cast into the closure panels and remain exposed to facilitate the closure concrete pour. Vertical reinforcement is added to match the adjoining precast panel reinforcement. The infill concrete is to be 4500 psi.
- Design Assumptions:** The weight of the soil used in the design was 110 psf. A lateral earth pressure of 85 psf/ft of depth was assumed.
- No concentrated loads due to machinery are allowed within 5 feet of the wall. A pumping dock design and access ramp details are included with the design submittal. The concrete strength used in this design is 4000 psi.
- Pumping dock options include precast and poured in place construction details. This information is contained in the design submittal only and not in the construction manual.

The maximum filling capacity assumed in the panel design was 1 foot below the panel top. In addition, the floor slab is poured over the panel base. This further reduces the available storage depth in the unit 11 inches. Therefore, the total depth available for manure storage computation is 1.9 feet less than the total panel height (see table).

Minimum and maximum soil backfill heights used in the design are shown in the table below.

Panel Height	Minimum Backfill (ft)*	Maximum Backfill (ft)*	Available Manure Storage Depth (ft)
8'-6"	1.5	6.5	6.6
10'-6"	1.5	7.5	8.6
12'-6"	1.5	10.5	10.6

\*Measured from the bottom of the panel base.

**Review and Acceptance:**

A review of the structural design submitted by the consulting engineer was performed by NRCS staff at the National Design Center in Fort Worth, Texas. The State Conservation Engineer in Wisconsin accepts that the design submitted meets the structural requirements of NRCS Standard 313.

**Conditions of Wisconsin Approval: Huffcutt Concrete’s design and installation manual requires that the wall panels and floor be placed on a stone or stone and sand base material.**

**Soils under the base material must meet Wisconsin NRCS Standard 313 Table 1 or Table 2. Soils that are imported to satisfy Table 2 must be extended 3 feet beyond the wall panel base.**

**Soils placed against the panel sides must meet Standard 313 Table 1, Table 2, or Table 5 (Concrete Composite).**

**HUFFCUTT CONCRETE**  
**PRECAST CONCRETE MANURE TROUGH 3’x10’x4’**

- Fabricator:** Huffcutt Concrete  
737 Herbert Street  
Chippewa Falls, WI 54729 (715) 723-7446
- Designer:** Gary K. Munkelt, P. E.  
Gary K. Munkelt & Associates  
Souderton, Pennsylvania
- Drawings and Installation Manual:** Gary K. Munkelt and Associates prepared a design, drawings and installation instructions for the manure trough in a document titled, “Design Precast Concrete Manure Trough 3’x10’x4’ “with a latest revision date of 9/9/02. Pages 1 through 9 contain the design assumptions, design calculations and reinforcing steel drawings. Appendix A contains the installation instructions, drawings, and acceptable soil conditions for installations. The final submittal was sealed and signed by Gary K. Munkelt, P.E. and dated 9/9/02.
- Materials:** The structure is precast concrete, 4000 psi, reinforced with Grade 40 steel. The manure gutter units are bolted together with Conseal CS-231 (or equivalent), controlled expansion sealant, and placed between the units. A hand troweled nonshrink grout is applied to the inside joint surface.
- Design Assumptions:** The manure trough sides and bottom are designed with the most critical scenario being the trough empty, full backfill condition. Tractor wheel loads of 5000 pounds were also applied.  
The soil loading used was 85 psf/ft equivalent fluid pressure.  
The manure trough cover slab can be 4 feet below grade.
- Review and Acceptance:** A review of the design submitted by the consulting engineer was performed by NRCS staff. The State Conservation Engineer in Wisconsin accepts that the design submitted meets the structural requirements of NRCS Standard 313.  
**Condition of Wisconsin Approval: To meet the requirements of Wisconsin NRCS Standard 313, the manure trough must be installed on sites with soils that meet the criteria in Standard 313 Table 1, or be placed on and backfilled with soils that meet the criteria of Table 2 or Table 5 (Concrete Composite) in Standard 313.**

**HUFFCUTT CONCRETE  
PRECAST CONCRETE SAND GUTTER 3'x12'x3'**

- Fabricator:** Huffcutt Concrete  
737 Herbert Street  
Chippewa Falls, WI 54729 (715) 723-7446
- Designer:** Gary K. Munkelt, P. E.  
Gary K. Munkelt & Associates  
Souderton, Pennsylvania
- Drawings and Installation Manual:** Gary K. Munkelt and Associates prepared a design, drawings and installation instructions for the manure gutter in a document titled, "Design Precast Concrete Sand Gutter 3'x12'x3'" dated 5/9/03. Pages 1 through 11 contain the design assumptions, design calculations and reinforcing steel drawings. Appendix A contains the installation instructions, drawings, and acceptable soil conditions for installations. The final submittal was sealed and signed by Gary K. Munkelt, P.E. and dated 5/9/03.
- Materials:** The structure is precast concrete, 4000 psi, reinforced with Grade 40 steel.  
  
The sand gutter units are bolted together with Con Seal CS-231 (or equivalent), controlled expansion sealant, and placed between the units. A hand troweled nonshrink grout is applied to the inside joint surface.
- Design Assumptions:** The sand gutter sides and bottom are designed with the most critical scenario being the gutter empty, full backfill condition. Tractor wheel loads of 5000 pounds were also applied.  
  
The soil loading used was 85 psf/ft equivalent fluid pressure.  
  
The sand gutter cover slab can be 2 feet below grade.
- Review and Acceptance:** A review of the design submitted by the consulting engineer was performed by NRCS staff. The State Conservation Engineer in Wisconsin accepts that the design submitted meets the structural requirements of NRCS Standard 313.  
  
**Condition of Wisconsin Approval: To meet the requirements of Wisconsin NRCS Standard 313, the sand gutter must be installed on sites with soils that meet the criteria in Standard 313 Table 1, or be placed on and backfilled with soils that meet the criteria of Table 2 or Table 5 (Concrete Composite).**

**CST STORAGE**  
**(FORMERLY ENGINEERED STORAGE PRODUCTS COMPANY)**  
**(FORMERLY A. O. SMITH HARVESTORE PRODUCTS, INC.)**

**Designer and  
Manufacturer:** CST Storage  
Division of CST Industries, Inc.  
345 Harvestore Drive  
DeKalb, IL 60115 (815) 756-1551

**Product Name** Slurrystore

**Drawings and  
Installation  
Manual:** CST Storage will provide a design and drawings for a storage tank that is specific to the client's need for storage volume and possible tank expansion. These structural detail drawings must be included in a site plan prepared by others.

CST Storage will be assuming all responsibility for the compliance of the Slurrystore tank with the structural and foundation requirements of NRCS Standard 313. A CST Storage engineer licensed in Wisconsin will stamp and sign the cover sheet of each submittal package along with the following statement:

“The design in this submittal package complies with the national NRCS Waste Storage Facility Standard (Code 313) criteria for fabricated structures, including foundations, liquid tightness, structural loadings, structural design, and slabs on grade.”

The installation manual titled “Slurrystore Structure Construction Manual,” copyright 2005 is to be available from the fabrication crew on-site. This manual covers all the 90-Series, 96-Series, and 2000-Series Structures.

**Materials:** The structure shell consists of glass fused to steel sheets that are bolted together.

Footing walls and floor are to be 3500 psi concrete in accordance with Wisconsin Construction Specification 4, Concrete.

Cathodic protection is required and is provided by zinc anodes electrically connected to the shell sheets and the floor and footing reinforcement.

Foundation sheets contain a two-part continuous seal. The upper sealant is a gray seal strip. Directly below is a black bentonite seal strip. This bentonite strip may also be used for sealing pipe penetrations through the concrete floor. The seal strip materials are not to be applied to the sheets or pipe penetrations at temperatures below 20°F.

**Design Assumptions:**

1. The shell design assumes above ground application only (no backfill). A specific site design may be provided by CST Storage that allows a limited backfill.
2. The footing strength design is based on a minimum 3000 psi concrete strength.
3. The final concrete floor slab reinforcement will be determined by the installer based on the tank diameter to be constructed. Most slabs will be reinforced to allow a monolithic pour.

The soil bearing capacity under the structure must be a minimum of 2000 psf or the bearing strength required in the CST design. This determination is the responsibility of a competent engineer retained by the owner.

**Construction Certification:**

The CST Storage licensed engineer who certified the design will also certify that the completed installation meets the manufacturer's plans and specifications, based on the certification of the trained dealer who performed the installation. The following statement will suffice to document the certification of the Slurrystore tank installation, along with the stamp of the Wisconsin licensed engineer:

“To the best of my professional knowledge, judgment, and belief, the storage tank has been installed in accordance with the construction drawings and specifications and meets the national NRCS Waste Storage Facility Standard (Code 313) criteria for fabricated structures.”

**NRCS Review and Approval:**

The State Conservation Engineer in Illinois has concurred in an independent review performed by a consultant that the structural design is in accordance to NRCS Standard 313 for the 90-Series and 96-Series. The 2000-Series tanks are designed using the same principles as the previously approved tanks.

The Illinois State Conservation Engineer accepted the “one-at-a-time” business design model employed by Engineered Storage Products Company in a letter dated May 15, 2008.

The State Conservation Engineer in Wisconsin concurs in the use of this procedure.

**PIPPING CONCRETE**

**Owner and Fabricator:** Pipping Concrete, Inc.  
N5888 Center Road  
Brandon, WI 53919

**Designer:** James W. Todd, P.E.  
Excel Engineering, Inc.  
Fond du Lac, WI

**Drawings:** Excel Engineering will provide a design and drawings for a storage tank that is specific to the client's need for storage volume. These structural details must be included in a site plan prepared by others.

Excel Engineering will be assuming responsibility for the compliance of the tank with the structural and foundation requirements of NRCS Standard 313. An engineer from Excel Engineering licensed in Wisconsin will stamp and sign the cover sheet of each submittal package along with the following statement:

“The design in this submittal package complies with the NRCS Waste Storage Facility Standard (Code 313) criteria for fabricated structures, including foundation, liquid tightness, structural loadings, structural design, and slabs on grade.”

**Material and Design:** The storage structures are reinforced concrete tanks. Circular tanks are available in various diameters and in heights of 12 or 16 feet. Rectangular tanks are available in heights of 12 feet.

Access ramps into the storage tanks are an available option.

Concrete strength required is 4000 psi at 28 days for the walls and floor slab. Grade 60 steel is utilized.

The structure design will be based on soils at the site, surcharge requirements, and backfill conditions dictated by the site or needs of the operator.

**Construction  
Certification:**

The Excel Engineering, Inc., licensed engineer who certified the design will also need to certify that the completed tank installation meets the design and construction plans, based on the data provided by the Pipping superintendent of the site construction crew who performed the installation. The following statement will be sufficient to document the certification of the Pipping tank installation, along with the stamp of the licensed engineer:

“To the best of my professional knowledge, judgment and belief, the storage tank has been installed in accordance with the construction drawings and specifications and meets the NRCS Waste Storage Facility Standard (Code 313) criteria for fabricated structures.”

**NRCS Review and  
Approval:**

The NRCS National Design, Construction, and Soil Mechanics Center reviewed sample designs for circular and rectangular storage tanks. Their review concluded that the design meets the requirements of Standard 313.

The State Conservation Engineer in Wisconsin accepted the “one-at-a-time” design business model employed by Pipping Concrete in a letter dated July 3, 2008.

## WIESER'S L-PANEL MANURE STORAGE FACILITY

- Owner and Manufacturer:** Wieser Concrete Products, Inc.  
W3716 U. S. Highway 10  
Maiden Rock, Wisconsin 54750  
715/647-2311 Toll Free 800/325-8456
- Designer:** Original designer: (8'-6")  
Reigstad & Associates  
St. Paul, MN  
  
Latest Standard 313 criteria designer: (8'-6" and 12')  
Greg A. Jewell, P. E.  
Spring Green, Wisconsin
- Drawings and Installation Manual:** The construction drawings (26 pages) are in the document titled INSTALLATION MANUAL, L-PANEL MANURE STORAGE FACILITY, January 21, 2003, revised August 24, 2004. The installation manual is signed and sealed by Mark A. Wieser, P.E.
- Materials:**
- Wall panels are 8'-6" or 12' high precast ribbed panels with 5000 psi concrete and Grade 60 steel.
  - Wall panels are bolted together with 5/8 inch bolts and sealed with Con-Seal Butyl Resin Sealant (CS 102 or 202).
  - Floor slab and footings are site cast with a minimum 3500 psi concrete and reinforced per Floor Type options shown in the Installation Manual.
  - Wall panels are secured to the floor slab with anchor bolts of various diameters.
  - Site soils and backfill requirements and options are listed in the Installation Manual.
- Design Assumptions:** The wall panels are designed for a full backfill, tank empty condition, and a tank full condition with backfill 4 feet below the top of the wall for both the 8'6" and 12' panels. Equivalent fluid pressures are 65 psf for the manure and 65 psf for the soil backfill. An equipment surcharge loading equal to two feet of backfill soil (130 psf) is provided. A complete listing of loadings is contained on page 2 of the Installation Manual drawings.  
  
See "Review and Acceptance" on the back of this page for additional site soil requirements.

**Review and  
Acceptance:**

An independent review of the 8'-6" structure design was performed by Jewell & Associates of Spring Green, Wisconsin. They determined the design required only minor revisions to meet the structural design requirements of NRCS Standard 313.

The State Conservation Engineer in Wisconsin accepted the independent engineering review of the 8'-6" panel design and revisions to the installation manual for compliance with the Wisconsin NRCS Standard 313.

NRCS engineering staff performed a review of the 12' structure design performed by Jewell and Associates and have determined it to be in compliance with Standard 313.

**Conditions of Wisconsin Approval:**

A. Backfill

The structure panels must always be backfilled with soils that meet the minimum criteria in Table 5 (Concrete-Soil Composite).

B. Foundation soil/floor slab options

1. The in-place soils below the floor slab meet the criteria contained in Table 1 or 2 in Standard 313. The floor slab may be reinforced to handle the anticipated loadings. A sand/gravel base is allowed.
2. Foundation soils meet the criteria in Table 5, Concrete-Soil Composite, in Standard 313. The floor slab is reinforced with #3 bars at 18 inches each way and no control joints are required. The slab is poured directly onto the foundation soils. No sand/gravel base is allowed.
3. Foundation soils may be of any composition that provides adequate bearing capacity for the floor slab and panels. The floor slab is reinforced and control joints spaced per the subgrade drag theory computation. Joints must contain an imbedded non-metallic waterstop. A sand/gravel base is allowed.

## NORTHERN CONCRETE

**Owner and  
Fabricator:**

Northern Concrete, Inc.  
6601 County Road R  
Denmark, WI 54208

**Designer:**

Conestoga-Rovers & Associates  
Green Bay, WI

**Drawings:**

Conestoga-Rovers & Associates (CRA) will provide a design and drawings for a storage tank that is specific to the client's need for storage volume. These structural details must be included in a site plan prepared by CRA or others.

CRA will be assuming responsibility for the compliance of the tank with the structural and foundation requirements of NRCS Standard 313. An engineer from CRA licensed in Wisconsin will stamp and sign the cover sheet of each submittal package along with the following statement:

“The design in this submittal package complies with the NRCS Waste Storage Facility Standard (Code 313) criteria for fabricated structures, including foundation, liquid tightness, structural loadings, structural design, and slabs on grade.”

**Material and  
Design:**

The storage structures are reinforced concrete tanks. Circular tanks are available in various diameters and in heights of 12 feet.

Access ramps into the storage tanks are an available option.

Concrete compressive strength required is 4000 psi at 28 days for the walls and floor slab. Grade 60 steel is utilized.

The structure design will be based on soils at the site, surcharge requirements, and backfill conditions dictated by the site or needs of the operator.

**Construction  
Certification:**

The CRA engineer licensed in Wisconsin who certified the design will also need to certify that the completed tank installation meets the design and construction plans. The following statement will be sufficient to document the certification of the installation, along with the stamp of the licensed engineer:

“To the best of my professional knowledge, judgment and belief, the storage tank has been installed in accordance with the construction drawings and specifications and meets the NRCS Waste Storage Facility Standard (Code 313) criteria for fabricated structures.”

**NRCS Review and  
Approval:**

The NRCS Upper Midwest Multi-State Design Team in Des Moines, Iowa, reviewed sample designs for circular storage tanks. Their review concluded that the design meets the requirements of Standard 313.

The State Conservation Engineer in Wisconsin accepted the “one-at-a-time” design business model employed by Northern Concrete, Inc., and CRA in a letter dated September 20, 2011.