Hopper Ladder Make-Up Packages

Wide-Corr® Grain Bin
Installation and Storage Instructions

Original Instructions

Read this manual before using product. Failure to follow instructions and safety precautions can result in serious injury, death, or property damage. Keep manual for future reference.
**New in this Manual**

The following changes have been made in this revision of the manual:

<table>
<thead>
<tr>
<th>Description</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optional vertical support ladder details section</td>
<td>Section 6.2 – Optional Vertical Support Ladder Details on page 39</td>
</tr>
</tbody>
</table>
# CONTENTS

1. **Introduction** ........................................................................................................................................... 5

2. **Safety** .................................................................................................................................................. 6
   2.1 Safety Alert Symbol and Signal Words .......................................................................................... 6
   2.2 General Safety .................................................................................................................................. 6
   2.3 Personal Protective Equipment ...................................................................................................... 7
   2.4 Safety Decals ..................................................................................................................................... 7
   2.5 Decal Installation/Replacement ...................................................................................................... 7
   2.6 Safety Decal Locations and Details .............................................................................................. 8

3. **Before You Begin** ................................................................................................................................. 11
   3.1 Bin Design and Capacity ................................................................................................................ 11
   3.1.1 Roof Design Capacities for Non-Structural Roofs ................................................................ 12
   3.1.2 Roof Design Capacities for Structural Roofs .......................................................................... 13
   3.1.3 Roof Snow Load vs. Ground Snow Load ................................................................................ 14
   3.2 Foundation Design and Loads ...................................................................................................... 14
   3.3 Site and Assembly .......................................................................................................................... 14
   3.4 Methods of Installation ................................................................................................................. 15
   3.5 Critical Assembly Requirements ................................................................................................. 15
   3.6 Product Storage ................................................................................................................................ 16
   3.7 Grain Bin Use .................................................................................................................................... 17
   3.8 Important Notes ................................................................................................................................ 18

4. **Preparation** .......................................................................................................................................... 19
   4.1 Check Shipment ............................................................................................................................... 19
   4.2 List of Tools and Equipment ......................................................................................................... 19
   4.3 Order Optional Equipment ........................................................................................................... 19

5. **Assembly** ............................................................................................................................................ 20
   5.1 Assembly Safety ............................................................................................................................. 20
   5.2 Ladder System Safety Requirements .......................................................................................... 21
   5.3 Welded Hopper Ladder Make-Up Packages .............................................................................. 22
      5.3.1 Welded Hopper Make-Up Package - 14’ x 35° ..................................................................... 23
      5.3.2 Welded Hopper Make-Up Package - 15’ x 35° ..................................................................... 24
      5.3.3 Welded Hopper Make-Up Package - 16’ x 35° ..................................................................... 25
      5.3.4 Welded Hopper Make-Up Package - 18’ x 35° ..................................................................... 26
      5.3.5 Welded Hopper Make-Up Package - 19’ x 35° ..................................................................... 27
      5.3.6 Welded Hopper Make-Up Package - 21’ x 35° ..................................................................... 28
      5.3.7 Welded Hopper Make-Up Package - 24’ x 35° ..................................................................... 29
      5.3.8 Welded Hopper Make-Up Package - 27’ x 35° ..................................................................... 30
      5.3.9 Angle Bracket Attachment and Foundation Details .............................................................. 31
   5.4 SeedStor-K Ladder Make-Up Packages ....................................................................................... 32
      5.4.1 SeedStor-K Ladder Make-Up Package - 15’ x 45° ............................................................... 33
      5.4.2 SeedStor-K Ladder Make-Up Package - 18’ x 45° ............................................................... 34
      5.4.3 SeedStor-K Ladder Make-Up Package - 21’ x 45° and 24’ x 40° ........................................... 35
      5.4.4 SeedStor-K Ladder Make-Up Package 27’ x 40° ................................................................. 36
   5.4.5 Angle Bracket Attachment and Foundation Details (SSK) .................................................... 37

6. **Appendix** ............................................................................................................................................ 38
   6.1 Wide-Corr® Hopper Ladder Make-Up Packages ...................................................................... 38
6.2 Optional Vertical Support Ladder Details ................................................................. 39
6.3 Ladder Parts Identification ....................................................................................... 42

7. Limited Warranty: Westeel Grain Bin Products .......................................................... 43
1. Introduction

This manual describes how to assemble a Westeel Hopper Ladder Make-Up Packages.

Before assembling, please read this manual. Familiarize yourself with the process and the necessary precautions for efficient and safe assembly.

Everyone present at the assembly site is required to be familiar with all safety precautions.

Keep this manual available for frequent reference and review it with new personnel. Call your local distributor or dealer if you need assistance or additional information.
2. Safety

2.1. Safety Alert Symbol and Signal Words

This safety alert symbol indicates important safety messages in this manual. When you see this symbol, be alert to the possibility of injury or death, carefully read the message that follows, and inform others.

**Signal Words:** Note the use of the signal words **DANGER**, **WARNING**, **CAUTION**, and **NOTICE** with the safety messages. The appropriate signal word for each message has been selected using the definitions below as a guideline.

- **DANGER**: Indicates an imminently hazardous situation that, if not avoided, will result in serious injury or death.
- **WARNING**: Indicates a hazardous situation that, if not avoided, could result in serious injury or death.
- **CAUTION**: Indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.
- **NOTICE**: Indicates a potentially hazardous situation that, if not avoided, may result in property damage.

2.2. General Safety

**YOU** are responsible for the **SAFE** assembly and installation of the hopper ladder. **YOU** must ensure that you and anyone else who is going to assemble/install the hopper ladder understands all procedures and related **SAFETY** information contained in this manual.

Remember, **YOU** are the key to safety. Good safety practices not only protect you, but also the people around you. Make these practices a working part of your safety program. All accidents can be avoided.

- It is the hopper ladder assembler and installation personnel's responsibility to read and understand **ALL** safety instructions, safety decals, and manuals and follow them when assembling, operating, or maintaining the equipment.

- Only experienced personnel who are familiar with this type of assembly and installation should perform this work. Untrained assemblers/installers expose themselves and bystanders to possible serious injury or death.

- Do not modify the hopper ladder in any way without written permission from the manufacturer. Unauthorized modification may impair the function and/or safety, and could affect the life of the hopper ladder. Any unauthorized modification of the hopper ladder will void the warranty.

- Follow a health and safety program for your worksite. Contact your local occupational health and safety organization for information.
2.3. Personal Protective Equipment

The following Personal Protective Equipment (PPE) should be worn when installing the equipment.

Safety Glasses
• Wear safety glasses at all times to protect eyes from debris.

Coveralls
• Wear coveralls to protect skin.

Hard Hat
• Wear a hard hat to help protect your head.

Steel-Toe Boots
• Wear steel-toe boots to protect feet from falling debris.

Work Gloves
• Wear work gloves to protect your hands from sharp and rough edges.

2.4. Safety Decals

• Keep safety decals clean and legible at all times.
• Replace safety decals that are missing or have become illegible. See decal location figures that follow.
• Replaced parts must display the same decal(s) as the original part.
• Replacement safety decals are available free of charge from your distributor, dealer, or factory as applicable.

2.5. Decal Installation/Replacement

1. Decal area must be clean and dry, with a temperature above 50°F (10°C).
2. Decide on the exact position before you remove the backing paper.
3. Align the decal over the specified area and carefully press the small portion with the exposed sticky backing in place.
4. Slowly peel back the remaining paper and carefully smooth the remaining portion of the decal in place.
5. Small air pockets can be pierced with a pin and smoothed out using the sign backing paper.
2.6. Safety Decal Locations and Details

Replicas of the safety decals that are attached to the hopper ladder and their messages are shown in the figure(s) that follow. Safe operation and use of the hopper ladder requires that you familiarize yourself with the various safety decals and the areas or particular functions that the decals apply to, as well as the safety precautions that must be taken to avoid serious injury, death, or damage.

Figure 1. Safety Decals
SAFETY INSTRUCTIONS

• Read operator’s manual and all safety decals before assembling, using, or servicing bin.
• Close/latch all access doors when not in use.
• Do not alter or modify bin structure.
• Replace any damaged components only with factory made components.
• This bin should only be used to store free flowing, granular material, unless specifically designed and marked otherwise.
• When filling, use top filler cap and direct material to center of bin.
• Do not over-fill bin. Material should not be in contact with or place pressure on roof sheets.

ENTRAPMENT HAZARD

Never enter the bin when loading or unloading grain.

If you must enter the bin:
1. Shut off and lock out all power.
2. Use a lifeline, safety harness, and have an observer outside before entering the bin.
3. Wear proper breathing equipment or a respirator.
4. Avoid the center of the bin.

Failure to heed these warnings could result in serious injury or death.
To prevent serious injury or death:
• Do not climb ladder if damaged, wet, icy, greasy, or slippery.
• Maintain good balance by having at least three points of contact at all times.

WARNING
FALLING HAZARD
To prevent serious injury or death:
• Do not climb ladder if damaged, wet, icy, greasy, or slippery.
• Maintain good balance by having at least three points of contact at all times.

Part Number: 8110–00136

NOTICE
When equipped with aeration system, to prevent roof and/or bin damage:
• Use a minimum 1 square foot (0.1m²) opening for each 1000ft³/min (30m³/min) of air.
• Ensure all roof vents are open and unobstructed.
• Discontinue use of aeration fan if roof vents become obstructed with ice.

Part Number: 8110–00066

FALL RESTRAINT
ANCHOR POINT
MAX WORKING LOAD: 1,000 lb [453 kg]
SEE MANUFACTURER ROOF MANUAL FOR DETAILED INSTRUCTIONS REGARDING ANCHOR POINT LOCATIONS

Part Number: 8110–01090
3. Before You Begin

3.1. Bin Design and Capacity

Standard Westeel Grain Bins are designed for:

1. Non-corrosive free-flowing materials up to 55 lbs/ft$^3$ (880 kg/m$^3$) average compacted bulk density.
2. Maximum horizontal gusted wind speed of 94 mph (151 km/h).

**Note**
Seismic resistance in grain bins varies with height and diameter. Many standard designs have significant seismic capabilities. Designs can be reviewed and/or modified to reflect local seismic requirements.

4. Roof loading capabilities vary with diameter, peak load and snow load.
   a. Peak Loads – standard peak loads follow. *Upgrades are available.*

<table>
<thead>
<tr>
<th>Size</th>
<th>Type of Roof</th>
<th>Load (lbs)</th>
<th>Load (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15' to 24'</td>
<td>non-structural</td>
<td>4000 lbs</td>
<td>1814 kg</td>
</tr>
<tr>
<td>27' to 48'</td>
<td>non-structural</td>
<td>5000 lbs</td>
<td>2268 kg</td>
</tr>
<tr>
<td>51' &amp; 54'</td>
<td>non-structural</td>
<td>8000 lbs</td>
<td>3629 kg</td>
</tr>
<tr>
<td>48' to 108'</td>
<td>structural</td>
<td>20,000 lbs</td>
<td>9072 kg</td>
</tr>
</tbody>
</table>

b. Roof Snow Loads (RSL) – at the above stated standard peak loads, standard RSLs vary with diameter and range from 16 psf (78 kg/m$^2$) to 45 psf (220 kg/m$^2$). *Upgrades are available.*

**Note**
The correlation between ground snow load (GSL) and roof snow load (RSL) for grain bin designs vary with jurisdictions. In the US GSL = 2 x RSL. In Europe GSL = 1.25 x RSL. In Canada the correlation between GSL and RSL varies and is site specific.

c. For maximum roof snow load capacities for various sizes and types of roofs, refer to the Roof Design Capacities sections that follow.
### 3.1.1 Roof Design Capacities for Non-Structural Roofs

#### Table 2. Maximum Roof Snow Load at STANDARD Peak Load

<table>
<thead>
<tr>
<th>Bin Series</th>
<th>Std Peak Load</th>
<th>Standard Roof</th>
<th>Plus Upgrade 1</th>
<th>Plus Upgrade 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lbs (kN)</td>
<td>psf</td>
<td>kPa</td>
<td>psf</td>
</tr>
<tr>
<td>15</td>
<td>4000 (17.8)</td>
<td>45</td>
<td>2.15</td>
<td>n/a</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>45</td>
<td>2.15</td>
<td>n/a</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>45</td>
<td>2.15</td>
<td>n/a</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>30</td>
<td>1.44</td>
<td>49</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>21</td>
<td>1.01</td>
<td>40</td>
</tr>
<tr>
<td>27</td>
<td></td>
<td>24</td>
<td>1.15</td>
<td>39</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>20</td>
<td>0.96</td>
<td>32</td>
</tr>
<tr>
<td>33</td>
<td></td>
<td>23</td>
<td>1.10</td>
<td>33</td>
</tr>
<tr>
<td>36</td>
<td></td>
<td>24</td>
<td>1.15</td>
<td>30</td>
</tr>
<tr>
<td>39</td>
<td></td>
<td>22</td>
<td>1.05</td>
<td>27</td>
</tr>
<tr>
<td>42</td>
<td></td>
<td>19</td>
<td>0.91</td>
<td>24</td>
</tr>
<tr>
<td>45</td>
<td></td>
<td>16</td>
<td>0.77</td>
<td>23</td>
</tr>
<tr>
<td>48</td>
<td></td>
<td>21</td>
<td>1.01</td>
<td>26</td>
</tr>
<tr>
<td>51</td>
<td></td>
<td>20</td>
<td>0.96</td>
<td>28</td>
</tr>
<tr>
<td>54</td>
<td></td>
<td>17</td>
<td>0.81</td>
<td>27</td>
</tr>
</tbody>
</table>

#### Table 3. Maximum Roof Snow Load at UPGRADED Peak Load

<table>
<thead>
<tr>
<th>Bin Series</th>
<th>Upgraded Peak Load</th>
<th>Standard Roof</th>
<th>Plus Upgrade 1</th>
<th>Plus Upgrade 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lbs (kN)</td>
<td>psf</td>
<td>kPa</td>
<td>psf</td>
</tr>
<tr>
<td>15</td>
<td>8000 (35.6)</td>
<td>29</td>
<td>1.39</td>
<td>n/a</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>29</td>
<td>1.39</td>
<td>n/a</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>29</td>
<td>1.39</td>
<td>n/a</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>24</td>
<td>1.15</td>
<td>40</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>17</td>
<td>0.81</td>
<td>27</td>
</tr>
<tr>
<td>27</td>
<td></td>
<td>19</td>
<td>0.91</td>
<td>28</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>15</td>
<td>0.72</td>
<td>24</td>
</tr>
<tr>
<td>33</td>
<td></td>
<td>18</td>
<td>0.86</td>
<td>24</td>
</tr>
<tr>
<td>36</td>
<td></td>
<td>18</td>
<td>0.86</td>
<td>23</td>
</tr>
<tr>
<td>39</td>
<td></td>
<td>16</td>
<td>0.77</td>
<td>21</td>
</tr>
<tr>
<td>42</td>
<td></td>
<td>14</td>
<td>0.67</td>
<td>19</td>
</tr>
<tr>
<td>45</td>
<td></td>
<td>13</td>
<td>0.62</td>
<td>18</td>
</tr>
<tr>
<td>48*</td>
<td></td>
<td>16</td>
<td>0.77</td>
<td>21</td>
</tr>
<tr>
<td>51*</td>
<td></td>
<td>14</td>
<td>0.67</td>
<td>21</td>
</tr>
<tr>
<td>54*</td>
<td></td>
<td>13</td>
<td>0.62</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note**

1. Standard roofs are adequate for many applications but additional capacity is available when optional upgrade packages are used.
2. Upgrade packages include roof stiffening rings and/or rib supports.
3. For peak load between standard and upgrade limits, a straight line interpolation can be used to determine maximum roof snow load.
4. *Structural roofs for 48’ – 54’ with rafters are available to support peak ring loads greater than loads on Table 3.
5. Higher level upgrade kits include all components from lower level kit; only one upgrade kit needs to be ordered for any given bin.
3.1.2 Roof Design Capacities for Structural Roofs

Table 4. Maximum Roof Snow Load at STANDARD Peak Loads

<table>
<thead>
<tr>
<th>Bin Series</th>
<th>Std Peak Load (lbs (kN))</th>
<th>psf</th>
<th>kPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>20000 (89.0)</td>
<td>39</td>
<td>1.87</td>
</tr>
<tr>
<td>51</td>
<td></td>
<td>39</td>
<td>1.87</td>
</tr>
<tr>
<td>54</td>
<td></td>
<td>39</td>
<td>1.87</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>39</td>
<td>1.87</td>
</tr>
<tr>
<td>66</td>
<td></td>
<td>38</td>
<td>1.82</td>
</tr>
<tr>
<td>72</td>
<td></td>
<td>38</td>
<td>1.82</td>
</tr>
<tr>
<td>75</td>
<td></td>
<td>37</td>
<td>1.77</td>
</tr>
<tr>
<td>78</td>
<td></td>
<td>37</td>
<td>1.77</td>
</tr>
<tr>
<td>84</td>
<td></td>
<td>37</td>
<td>1.77</td>
</tr>
<tr>
<td>90</td>
<td></td>
<td>37</td>
<td>1.77</td>
</tr>
<tr>
<td>96</td>
<td></td>
<td>37</td>
<td>1.77</td>
</tr>
<tr>
<td>102</td>
<td></td>
<td>32</td>
<td>1.53</td>
</tr>
<tr>
<td>105</td>
<td></td>
<td>32</td>
<td>1.53</td>
</tr>
<tr>
<td>108</td>
<td></td>
<td>32</td>
<td>1.53</td>
</tr>
</tbody>
</table>

20000 (89.0)

Table 5. Maximum Roof Snow Load at UPGRADED Peak Loads

<table>
<thead>
<tr>
<th>Bin Series</th>
<th>Upgraded Peak Load (lbs (kN))</th>
<th>psf</th>
<th>kPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>60000 (266.9)</td>
<td>38</td>
<td>1.82</td>
</tr>
<tr>
<td>51</td>
<td></td>
<td>38</td>
<td>1.82</td>
</tr>
<tr>
<td>54</td>
<td></td>
<td>38</td>
<td>1.82</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>38</td>
<td>1.82</td>
</tr>
<tr>
<td>66</td>
<td></td>
<td>37</td>
<td>1.77</td>
</tr>
<tr>
<td>72</td>
<td></td>
<td>37</td>
<td>1.77</td>
</tr>
<tr>
<td>75</td>
<td></td>
<td>36</td>
<td>1.72</td>
</tr>
<tr>
<td>78</td>
<td></td>
<td>36</td>
<td>1.72</td>
</tr>
<tr>
<td>84</td>
<td></td>
<td>36</td>
<td>1.72</td>
</tr>
<tr>
<td>90</td>
<td></td>
<td>34</td>
<td>1.63</td>
</tr>
<tr>
<td>96</td>
<td></td>
<td>34</td>
<td>1.63</td>
</tr>
<tr>
<td>102</td>
<td></td>
<td>31</td>
<td>1.48</td>
</tr>
<tr>
<td>105</td>
<td></td>
<td>31</td>
<td>1.48</td>
</tr>
<tr>
<td>108</td>
<td></td>
<td>31</td>
<td>1.48</td>
</tr>
</tbody>
</table>

60000 (266.9)

**Note**

Standard capacities are provided. Additional capacity is available with optional upgrades.
3.1.3 Roof Snow Load vs. Ground Snow Load

The Roof Design Capacity tables reflect roof snow load (RSL) values. These are design values. Often, comparisons are made to ground snow values (GSL). These are not the same. The conversion from GSL to RSL varies between jurisdictions and is governed by building codes:

- In the United States, for grain bins, GSL = RSL x 2
- In Europe, for grain bins, GSL = RSL x 1.25
- In Canada, for grain bins, the GSL/RSL conversion varies with every location across the country. However, for comparison purposes, the US conversion can be used as an approximation.

Therefore, when comparing against competitive GSL values in the US, double the above values. When comparing against competitive GSL values in Canada, double the above values for a reasonably close approximation.

3.2. Foundation Design and Loads

The foundations for the stiffened bin models are based on 4000 lbs. per sq. ft. (192 kPa) soil bearing capacity. All foundation designs use 3000 lbs. per sq. in. (21 MPa) ultimate compressive strength (after 28 days) for concrete and 43,500 lbs. per sq. in. (300 MPa) re-bar. The foundation designs included in this manual are suggestions only, and will vary according to local soil conditions. Westeel will not assume any liability for results arising from their use.

**Important**
Foundation should be uniform and level. Level should not vary by more than ¼” over a span of four feet under the bottom ring angle. Any variance from level must be shimmed under upright base assembly. If being utilized to support a full floor aeration system, this levelness requirement should extend across the complete floor area.

3.3. Site and Assembly

Unless otherwise specifically provided in writing, Westeel does not take responsibility for any defects or damages to any property, or injury to any persons, arising from or related to any site or assembly considerations, including but not limited to:

- Bin location and bin siting
- Soil conditions and corresponding foundation requirements (note that the examples provided in manuals are for specifically stated soil conditions)
- Bin assembly (Wsteel recommends the use of qualified bin installers; contact Westeel for information on installers in your area)
- Field modifications or equipment additions that affect the bin structure
- Interconnections with neighboring structures
- Compliance with all applicable safety standards, including but not limited to fall restraint systems (ladders or other systems). Local safety authorities should be contacted as standards vary between jurisdictions.
3.4. Methods of Installation

The recommendations for assembling and installing Westeel grain bins must be closely followed to achieve the full strength of the bin and to achieve adequate weather sealing. The product warranty is void if:

1. Wall sheets and/or uprights not specified for a given tier are used.
2. Foundations are found to be inadequate or out-of-level.
3. Anchor bolts (cast-in-place, drill-in, chemical type or other) are found to be inadequate.
4. Off-center loading or unloading is used. (This does not apply to the use of approved side unloading systems.)
5. Materials stored are not free-flowing or have a compacted bulk density greater than 55 lbs/ft$^3$ (880 kg/m$^3$).

If using bin jacks during assembly, always lift on an upright. Choose a hoist with a adequate capacity for the expected empty bin deadload. Make sure the rated capacity of the hoist is not exceeded.

3.5. Critical Assembly Requirements

To ensure a successful, safe and reliable outcome you must comply with the following assembly techniques and practices:

1. Comply with all local code and jurisdictional requirements applicable to your hopper ladder installation.
2. Design and build foundations with the necessary strength for the loads they must support, and for local soil conditions. Westeel foundation guidelines are based on specific stated conditions and may not be applicable to local conditions.
3. Your foundation must provide uniform and level support to the structure being supported. Surface imperfections causing gapping must be remedied. This may involve, but not be limited to a) grouting under the bottom ring of a non-stiffened bin or tank, and b) shimming under the uprights of a stiffened bin or tank, or under the legs of a hopper.
4. Make sure that the proper hardware is utilized for all bolted connections. If a shortage occurs, do not substitute. Take the necessary steps to obtain the proper hardware. Make sure nuts are tightened to the required torque values as specified in the appropriate assembly manual.
5. Comply with all assembly instructions provided in the appropriate assembly manual to make sure your whole hopper ladder is constructed safely. Important: Do not deviate from the wall sheet and upright layouts provided.
6. Before anchoring your structure to its foundation, make sure the structure is round. The maximum variation from perfect roundness is 3/4" on the radius. Locate anchor bolts toward the outside of the anchor bolt holes (away from the circle) to permit the incremental expansion that can occur with the initial filling.
7. When installing roof stiffening rings, if it is necessary to shorten the stiffening ring tubes, shorten them as little as possible. Initially the nuts on the expanders should be centered and as close together as possible. When tightening, share the amount of take-up between expanders such that the nuts remain centered, and the amount of engagement between all expanders on the same ring is equalized.
8. If extending an existing bin or tank, ensure that the foundation is adequate for the increased loads it must support.
9. If installing an existing bin on a hopper, make sure the bin is designed for a hopper application, and that the foundation is capable of withstanding the substantial point loads that the hopper legs apply. If uprights are present, make sure that they are supported.
10. Make sure that an integral end-to-end connection exists between all mating uprights. Successive uprights must not overlap.
11. Vertical tolerances between uprights and wall sheets are tight. This can be affected by “jacking” techniques, which can allow the tolerance to grow or shrink depending on the technique used. The gapping between successive uprights must be monitored to ensure that upright holes align with wall sheet holes.

12. If catwalks are being installed on the structure, upright catwalk upgrades are likely required. The upgraded stiffeners must be installed in the correct locations to support the intended catwalk loads. Also, the structure must be properly oriented to ensure the eventual correct alignment between the catwalks and the supporting uprights. Finally, the connectors that tie into the uprights and support the catwalks are best installed during assembly of the structure. See the catwalk assembly manual for additional details.

### 3.6. Product Storage

**Rust on Galvanized Parts**

1. White rust forms when moisture is allowed to collect on galvanized surfaces that have yet to develop the durable zinc oxide layer. This zinc oxide layer naturally occurs as the surface interacts with carbon dioxide, and is characterized over time by the dull grey appearance that weathered galvanized surfaces get.

2. Parts that are not well ventilated or well drained can collect water between surfaces and develop white rust.

3. White rust is not a structural concern if its development is stopped in the early stages. A light film or powdery residue can occur after a period of heavy rainfall or a short time of improper storage. If white rust has started to develop, separate parts and wipe off any moisture. Next, using a clean cloth, apply a thin layer of petroleum jelly or food-grade oil to the entire part.

4. If moisture is left on parts, this white rust can become more aggressive and turn into red rust. Red rust can cause degradation in the material and become a structural concern. Any parts that have red rust should be replaced immediately.

**Storage Guidelines**

- Keep all bundles dry before assembly of the bin.
- Start assembly as soon as possible.
- Do not lay bundles on the bare ground. Raise all bundles 6" to 8" off the ground on wood blocks or timbers. (See Detail A in Figure 2 on page 16.)
- Store curved wall sheets ‘hump-up’. (See Detail A in Figure 2 on page 16.)
- All other bundles material should be placed so that they are well sloped to promote good drainage. (See Detail B in Figure 2 on page 16.)
- Roof sheets must be elevated at least 12" at the small end of the sheets. (See Detail B in Figure 2 on page 16.)
- Temporary storage can be provided by erecting a simple framework supporting a waterproof tarp. (See Detail C in Figure 2 on page 16.)
- All bin boxes, ladder boxes and hardware boxes should be stored inside. These are not waterproof, and will deteriorate in normal weather conditions, allowing moisture to contact the parts inside.

**Figure 2. Product Storage**

![Figure 2. Product Storage](image-url)
If Parts Become Wet

1. If parts become submerged or wet, the bundles should be opened as soon as possible, sheets or material separated and dried. Keep separated until assembly.

   Brace parts properly so as to avoid damage or injury from material falling when in storage. (See Detail D in Figure 2 on page 16.)

2. Any boxed parts that become wet should be dried and stored in a new box that is free of moisture.

3. In addition to wiping down wall sheets, a food-grade oil can also be applied with a clean, lint-free cloth. This will assist in preventing any further moisture from contacting the galvanizing on the steel. Due to safety concerns with installation and use, Westeel does not recommend the use of oil on other parts such as roof sheets and safety ladders.

3.7. Grain Bin Use

- Do not off-center unload a grain bin. It is imperative to unload from the center of the bin first, until as much grain as possible has been removed, and only then proceed to unload from the next closest unload gate to the center. Continue utilizing the unload gates in succession from the center towards the outside. Gate control mechanisms should be clearly marked and interconnected to prevent an external gate from being opened first.

- The only exception to center unloading is when a properly designed and installed side draw system is utilized. However, as bins tend to go out of round when employing side draws, the bin must be completely emptied before refilling.

- When unloading a bin with a mobile auger through a properly designed auger chute, the entry end of the auger should be pushed into the center of the bin before the auger is engaged. Slower rates of flow are preferable and should not exceed the capacity of an 8” auger.

- Ensure that the inner door panels of grain bin doors are completely closed and latched before filling the grain bin.

- Never enter a loaded grain bin for any reason. Grain can be a killer.
3.8. Important Notes

- Westeel does not provide a foundation design for this product, and is not liable for any damages or injuries related to inadequately designed or constructed foundations. Customers must contract professional services for all foundation design and construction work.

- In order to maintain your wall sheets in good condition separate sheets and allow air circulation between them. Store sheets in a dry place. Do not store sheets with sheet ends pointing upwards.

- To keep an even pressure on walls, the bin must always be unloaded from the centre.

- Contact local power officials for minimum power line clearance.

- See Section 3.5 – Critical Assembly Requirements on page 15 for mandatory siting and assembly requirements.

- Store only non-corrosive, free-flowing materials up to 55 lbs/ft$^3$ (880 kg/m$^3$) average compacted density in Westeel bins.

- Tighten all bolts to the recommended torque settings.

- Do not locate grain bins close to high buildings, which might cause snow to fall onto or build up on the roof of the grain bin. Consider future expansion and allow space for loading and unloading of the bin. Your dealer and local government agricultural consultants can help you plan your storage system for maximum efficiency.
4. Preparation

4.1. Check Shipment

Unload the parts at the assembly site and compare the packing slip to the shipment. Ensure that all items have arrived and that none are damaged.

Report damaged parts or shortages immediately to the delivering carrier, followed by a confirming letter requesting inspection by the carrier, if required. Order any replacement parts immediately to ensure that assembly will not be held up by missing parts. All parts will be charged for and credit will be issued by party at fault. No credit will be issued if freight bills are signed as received in good condition.

4.2. List of Tools and Equipment

Use quality tools and equipment. Use them safely, and correctly, for their intended use. Tools for this application should include:

**Tools**
- Electric or pneumatic (air) impact tools
- Power drill and drill bits
- Sockets (multiple 9/16" and 1/2" sockets recommended)
- Large-pocket carpenter pouch
- 8" (20 cm) metal punches (for aligning bolt holes)
- Step and extension ladders, construction grade
- 6-point wrenches (Imperial, box end)
- Metal-cutting saw suitable for cutting roof rings and wind rings
- Scaffolding
- Centre-post bin stand
- Crane and/or bin jacks

**Minimum Recommended Safety Equipment**
- A properly-stocked first-aid kit
- Eye, foot, head, and hand protection (safety glasses, steel-toed boots, hard hat, work gloves)
- Cable, chain, or rope to tie-off bin or jacks in case of wind
- Body harness and lifeline (for use where falling hazard exists)
- Ground fault interrupt protected electrical hook-ups

4.3. Order Optional Equipment

Optional equipment such as unloading augers, aeration equipment, anchor bolts, foundation sealant, external ladders, safety cage and platforms, etc., should all be on site and checked before assembly starts. Plan your installation in advance. For details, see assembly instruction supplied with optional equipment.
5. Assembly

Before continuing, ensure you have completely read and understood this manual’s Safety section, in addition to the safety information in the section(s) below.

5.1. Assembly Safety

• Do not take chances with safety. The components can be large, heavy, and hard to handle. Always use the proper tools, rated lifting equipment, and lifting points for the job.

• Carry out assembly in a large open area with a level surface.

• Always have two or more people assembling the hopper ladder.

• Make sure you have sufficient lighting for the work area.

• Tighten all fasteners according to their specifications. Do not replace or substitute bolts, nuts, or other hardware that is of lesser quality than the hardware supplied by the manufacturer.

• Stay away from overhead power lines and other obstructions during assembly. Contact with power lines can cause electrocution.

• Do not work in high winds.
5.2. Ladder System Safety Requirements

**Important**

- Regulations require that fixed ladders over a certain height must be outfitted with platforms and cages, or other approved fall arresting devices. For information on the specific requirements applicable in the jurisdiction in which a ladder is to be used, please consult the local health and safety authority. For information on how to contact your local authority, please ask your dealer.

- Affix warning label (234567) to the wall sheets beside the ladder where it will be most visible. Suggest locating at eye level (about 5½’ off the ground) on a flat bottom bin, or just above the bin/hopper interface on a hopper bin. Wipe wall sheet free of oil before applying.

- Product safety labels should be replaced when they are no longer legible. If the 'Ladder Safety Label' requires replacement, order part number 234567 from your local Westeel dealer and affix as directed.
5.3. Welded Hopper Ladder Make-Up Packages

Figure 3. Welded Hopper Ladder Make-Up Package Details

---

Note

1. Assemble the upper ladder and cage tiers as indicated in the Wide-Corr® ladder manual (198925).
2. Apply a warning label as shown in Section 5.2 – Ladder System Safety Requirements on page 21.
3. For 14’ welded hopper see Section 5.3.1 – Welded Hopper Make-Up Package - 14’ x 35° on page 23
4. For 15’ welded hopper see Section 5.3.2 – Welded Hopper Make-Up Package - 15’ x 35° on page 24
5. For 16’ welded hopper see Section 5.3.3 – Welded Hopper Make-Up Package - 16’ x 35° on page 25
6. For 18’ welded hopper see Section 5.3.4 – Welded Hopper Make-Up Package - 18’ x 35° on page 26
7. For 19’ welded hopper see Section 5.3.5 – Welded Hopper Make-Up Package - 19’ x 35° on page 27
8. For 21’ welded hopper see Section 5.3.6 – Welded Hopper Make-Up Package - 21’ x 35° on page 28
9. For 24’ welded hopper see Section 5.3.7 – Welded Hopper Make-Up Package - 24’ x 35° on page 29
10. For 27’ welded hopper see Section 5.3.8 – Welded Hopper Make-Up Package - 27’ x 35° on page 30
5.3.1 Welded Hopper Make-Up Package - 14' x 35°
(P/N 234481)

Figure 4. Welded Hopper Ladder Assembly — 14'

**Note:**
- Holes on the top of support channels align & bolt with mating holes on the ladder segment & hopper ring beam
- SC ladder clips are required at this location

**Detail 1**

- Bottom cage section uses 30" vertical supports
- Holes in ladder support channels align with mating holes on the ladder segments. This is the best means to align support channels

**Section A–A**

- Use 3/8" x 1" bolts to secure ladder to the support channels
- Install support channels (P/N 234487) so that flanges point outwards

**Figure 4.**
- Position the centre of SC ladder clip 14" up from horizontal seam and drill two holes on wall sheet crest
- 3/8" x 1½" bolt
- Bottom cage hoop (P/N 234162)
- Bolt to SC ladder clip

**Note**

1. Section 5.3.9 – Angle Bracket Attachment and Foundation Details on page 31
2. Section 5.4.5 – Angle Bracket Attachment and Foundation Details (SSK) on page 37
5.3.2 Welded Hopper Make-Up Package - 15' x 35°
(P/N 234531)

Figure 5. Welded Hopper Ladder Assembly — 15'

- Holes on the top of support channels align & bolt with mating holes on the ladder segment & hopper ring beam.
- No ladder clips are required at this location.

NOTE:

- Holes on the top of support channels align & bolt with mating holes on the ladder segment & hopper ring beam.
- No ladder clips are required at this location.

Section A-A
(FOR BOTH BOTTOM CAGE HOOPS)

Install ladder support channels (P/N 234488) so that flanges point outwards.

3/8" x 1¼" bolts to secure ladder & cage hoop to the support channel.

Use 3/8" x 1" bolts to secure ladder & cage hoop to the support channel.

NOTE:
- Holes on the top of support channels align & bolt with mating holes on the ladder segment & hopper ring beam.
- No ladder clips are required at this location.

Detail 1

Angle bracket P/N 234522
Trim bottom ladder segment to fit if necessary.

Bottom cage sections use 44" vertical support (as shown).

Holes in ladder support channels align with mating holes on the ladder segments. This is the best means to align support channels.

Bottom cage hoops bolt to support channels.
5.3.3 Welded Hopper Make-Up Package - 16' x 35°
(P/N 234482)

Figure 6. Welded Hopper Ladder Assembly — 16'

Sections A-A (for both bottom cage hoops)

NOTE:
- Holes on the top of support channels align & bolt with mating holes on the ladder segment & hopper ring beam.
- No ladder clips are required at this location.

Install ladder support channels (P/N 234489) so that flanges point outwards.

Use 3/8" x 1" bolts to secure ladder & cage hoop to the support channel.

Holes in ladder support channels align with mating holes on the ladder segments. This is the best means to align support channels.

Detail 1

Angle bracket P/N 234522

Bottom cage sections use 44" vertical support (as shown).

Bottom cage hoops bolt to support channels.

90.4"
5.3.4 Welded Hopper Make-Up Package - 18' x 35°
(P/N 234532)

Figure 7. Welded Hopper Ladder Assembly - 18'

NOTE:
- HOLES ON THE TOP OF SUPPORT CHANNELS ALIGN & BOLT WITH MATING HOLES ON THE LADDER SEGMENT & HOPPER RING BEAM
- NO LADDER CLIPS ARE REQUIRED AT THIS LOCATION

SECTION A-A
(FOR BOTH BOTTOM CAGE HOOPS)
5.3.5 Welded Hopper Make-Up Package - 19' x 35°
(P/N 234483)

Figure 8. Welded Hopper Ladder Assembly - 19'

NOTE:
- HOLES ON THE TOP OF SUPPORT CHANNELS ALIGN & BOLT WITH MATING HOLES ON THE LADDER SEGMENT & HOPPER RING BEAM
- SC LADDER CLIPS ARE REQUIRED AT THIS LOCATION

USE 3/8" x 1" BOLTS TO SECURE LADDER TO THE SUPPORT CHANNELS

INSTALL SUPPORT CHANNELS (P/N 234491) SO THAT FLANGES POINT OUTWARDS

SECTION A–A

NOTE:
- HOLES IN LADDER SUPPORT CHANNELS ALIGN WITH MATING HOLES ON THE LADDER SEGMENTS, THIS IS THE BEST MEANS TO ALIGN SUPPORT CHANNELS

USE 3/8" x 1¼" BOLTS TO SECURE LADDER TO THE SUPPORT CHANNELS

HOPPER RING BEAM

3/8" x 1½" BOLT

WALL SHEET

POSITION THE CENTRE OF SC LADDER CLIP 14" UP FROM HORIZONTAL SEAM AND DRILL TWO HOLES ON WALL SHEET CREST

STANDARD CAGE HOOP (P/N 234161)

BOLT TO SC LADDER CLIP

SC CLIP

LADDER

DETAIL 1

LADDER SUPPORT CHANNEL

30.0"

25.0"

90.8"

18.2"

BOTTOM TWO CAGE SECTION USES 25° & 30° VERTICAL SUPPORTS

DETAIL 1

BOTTOM CAGE HOOPS BOLT TO SUPPORT CHANNELS

ANGLE BRACKET P/N 234522

NOTE:
- HOLES ON THE TOP OF SUPPORT CHANNELS ALIGN & BOLT WITH MATING HOLES ON THE LADDER SEGMENT & HOPPER RING BEAM
- SC LADDER CLIPS ARE REQUIRED AT THIS LOCATION

USE 3/8" x 1" BOLTS TO SECURE LADDER TO THE SUPPORT CHANNELS

INSTALL SUPPORT CHANNELS (P/N 234491) SO THAT FLANGES POINT OUTWARDS

SECTION A–A

NOTE:
- HOLES IN LADDER SUPPORT CHANNELS ALIGN WITH MATING HOLES ON THE LADDER SEGMENTS, THIS IS THE BEST MEANS TO ALIGN SUPPORT CHANNELS
5.3.6 Welded Hopper Make-Up Package - 21' x 35°
(P/N 234533)

Figure 9. Welded Hopper Ladder Assembly - 21'

- HOLES ON THE TOP OF SUPPORT CHANNELS ALIGN & BOLT WITH MATING HOLES ON THE LADDER SEGMENT & HOPPER RING BEAM
- WC LADDER CLIPS ARE REQUIRED AT THIS LOCATION

USE 3/8" x 1" BOLTS TO SECURE LADDER TO THE SUPPORT CHANNELS

INSTALL SUPPORT CHANNELS (P/N 234492) SO THAT FLANGES POINT OUTWARDS

BOTTOM TWO CAGE SECTIONS USES 25" & 40" VERTICAL SUPPORTS

HOLES IN LADDER SUPPORT CHANNELS ALIGN WITH MATING HOLES ON THE LADDER SEGMENTS. THIS IS THE BEST MEANS TO ALIGN SUPPORT CHANNELS

NOTE:
- WALL SHEET
- POSITION LADDER CLIP 4" UP FROM HORIZONTAL SEAM AND DRILL HOLES ON CREST OF CORRUGATION. USE 3/8" x 1" BOLT
- LADDER CLIPS ARE REQUIRED AT THIS LOCATION
- LADDER SUPPORT CHANNEL
- WC LADDER CLIP
- STANDARD CAGE HOOP (P/N 234161) BOLT TO LADDER CLIP
- USE 3/8" x 1" BOLT
- NOTE:
- Holes in ladder support channels align with mating holes on the ladder segments. This is the best means to align support channels.
- WC ladder clips are required at this location.
5.3.7 Welded Hopper Make-Up Package - 24' x 35°
(P/N 234484)

Figure 10. Welded Hopper Ladder Assembly - 24'

NOTE:
- HOLES ON THE TOP OF SUPPORT CHANNELS ALIGN & BOLT WITH MATING HOLES ON THE LADDER SEGMENT & HOPPER RING BEAM
- NO LADDER CLIPS ARE REQUIRED AT THIS LOCATION

INSTALL LADDER SUPPORT CHANNELS (P/N 234494) SO THAT FLANGES POINT OUTWARDS

SECTION A–A
(FOR BOTH BOTTOM CAGE HOOPS)

USE 3/8" x 1" BOLTS TO SECURE LADDER & CAGE HOOP TO THE SUPPORT CHANNEL

BOTTOM TWO CAGE SECTIONS USE 30" & 44" VERTICAL SUPPORTS (AS SHOWN)

HOLES IN LADDER SUPPORT CHANNELS ALIGN WITH MATING HOLES ON THE LADDER SEGMENTS - THIS IS THE BEST MEANS TO ALIGN SUPPORT CHANNELS
5. ASSEMBLY

5.3.8 Welded Hopper Make-Up Package - 27' x 35°

(P/N 234485)

Figure 11. Welded Hopper Ladder Assembly - 27'

NOTE:
- Holes on the top of support channels align & bolt with mating holes on the ladder segment & hopper ring beam
- No ladder clips are required at this location

SECTION A–A
(FOR BOTH BOTTOM CAGE HOOPS)

HOLE IN LADDER SUPPORT CHANNELS ALIGN WITH MATING HOLES ON THE LADDER SEGMENTS. THIS IS THE BEST MEANS TO ALIGN SUPPORT CHANNELS

DETAIL 1

BOTTOM TWO CAGE SECTIONS USE 44" VERTICAL SUPPORT (AS SHOWN)
5.3.9 Angle Bracket Attachment and Foundation Details

Figure 12. Angle Bracket Attachment and Foundation Details
5.4. SeedStor-K Ladder Make-Up Packages

Figure 13. SeedStor-K Ladder Make-Up Package Details

Note

1. Assemble the upper ladder and cage tiers as indicated in the Wide-Corr® ladder manual (198925).
2. Apply a warning label as shown in Section 5.2 – Ladder System Safety Requirements on page 21.
3. For 15’ Seed Stor K see Section 5.4.1 – SeedStor-K Ladder Make-Up Package - 15’ x 45° on page 33
4. For 18’ Seed Stor K see Section 5.4.2 – SeedStor-K Ladder Make-Up Package - 18’ x 45° on page 34
5. For 21’ and 24’ Seed Stor K see Section 5.4.3 – SeedStor-K Ladder Make-Up Package - 21’ x 45° and 24’ x 40° on page 35
6. For 27’ Seed Stor K see Section 5.4.4 – SeedStor-K Ladder Make-Up Package 27’ x 40° on page 36
5.4.1 SeedStor-K Ladder Make-Up Package - 15' x 45°
(P/N 234536)

Figure 14. SeedStor-K Ladder Assembly - 15'

NOTE:
- HOLES ON THE TOP OF SUPPORT CHANNELS ALIGN & BOLT WITH MATING HOLES ON THE LADDER SEGMENT & HOPPER RING BEAM
- WC LADDER CLIPS ARE REQUIRED AT THIS LOCATION

- USE 3/8" x 1" BOLTS TO SECURE LADDER TO THE SUPPORT CHANNELS
- INSTALL SUPPORT CHANNELS (P/N 234526) SO THAT FLANGES POINT OUTWARDS
- POSITION LADDER CLIP 4" UP FROM HORIZONTAL SEAM AND DRILL HOLES ON CREST OF CORRUGATION. USE 3/8" x 1" BOLT
- LADDERS CLIPS ARE REQUIRED AT THIS LOCATION

- HOLES IN LADDER SUPPORT CHANNELS ALIGN WITH MATING HOLES ON THE LADDER SEGMENTS. THIS IS THE BEST MEANS TO ALIGN SUPPORT CHANNELS
- BOTTOM CAGE HOOPS BOLT TO SUPPORT CHANNELS
- BOTTOM TWO CAGE SECTIONS USES 25" & 40" VERTICAL SUPPORTS
- WALL SHEET
- STANDARD CAGE HOOP (P/N 234161) BOLT TO LADDER CLIP
- WC LADDER CLIP

SECTION A–A

DETAIL 1

198935 R14
5.4.2 SeedStor-K Ladder Make-Up Package - 18' x 45°
(P/N 234537)

Figure 15. SeedStor-K Ladder Assembly - 18'

NOTE:
- HOLES ON THE TOP OF SUPPORT CHANNELS ALIGN & BOLT WITH MATING HOLES ON THE LADDER SEGMENT & HOPPER RING BEAM
- NO LADDER CLIPS ARE REQUIRED AT THIS LOCATION

Bottom two cage sections use 44" & 40" vertical support respectively (as shown)

Sections "A-A" (for both bottom cage hoops)

Use 3/8" x 1" bolts to secure ladder & cage hoop to the support channel

Install ladder support channels (P/N 234527) so that flanges point outwards

3/8" x 1¼" bolts

30° angle bracket P/N 234522

Trim bottom ladder segment to fit if necessary

Holes in ladder support channels align with mating holes on the ladder segments - this is the best means to align support channels

Detail 1

44.0" 40.0" 89.3"
5.4.3 SeedStor-K Ladder Make-Up Package - 21' x 45° and 24' x 40°
(P/N 234538)

Figure 16. SeedStor-K Ladder Assembly - 21' and 24'

NOTE:
- HOLES ON THE TOP OF SUPPORT CHANNELS ALIGN & BOLT WITH MATING HOLES ON THE LADDER SEGMENT & HOPPER RING BEAM
- NO LADDER CLIPS ARE REQUIRED AT THIS LOCATION

HOLEs IN LADDER SUPPORT CHANNELS ALIGN WITH MATING HOLES ON THE LADDER SEGMENTS. THIS IS THE BEST MEANS TO ALIGN SUPPORT CHANNELS
5.4.4 SeedStor-K Ladder Make-Up Package 27’ x 40°
(P/N 234486)

Figure 17. SeedStor-K Ladder Assembly - 27’

- Holes on the top of support channels align & bolt with mating holes on the ladder segment & hopper ring beam.
- No ladder clips are required at this location.

NOTE:
- Holes on the top of support channels align & bolt with mating holes on the ladder segment & hopper ring beam.
- No ladder clips are required at this location.

USE 3/8” x 1” BOLTS TO SECURE LADDER & CAGE HOOP TO THE SUPPORT CHANNEL.

INSTALL LADDER SUPPORT CHANNELS (P/N 234493) SO THAT FLANGES POINT OUTWARDS.

SECTION A–A (FOR BOTH BOTTOM CAGE HOOPS)

HOLES IN LADDER SUPPORT CHANNELS ALIGN WITH MATING HOLES ON THE LADDER SEGMENTS. THIS IS THE BEST MEANS TO ALIGN SUPPORT CHANNELS.

DETAIL 1

BOTTOM THREE CAGE SECTIONS USE 30”, 40” & 44” VERTICAL SUPPORT (AS SHOWN).

ANGLE BRACKET P/N 234522

LADDER SUPPORT CHANNEL

STANDARD CAGE HOOP (P/N 234161)

WALL SHEET

HOPPER RING BEAM

3/8” x 1 1/4” BOLT

DETAIL 1

BOTTOM THREE CAGE HOOPS BOLT TO SUPPORT CHANNELS.
5.4.5 Angle Bracket Attachment and Foundation Details (SSK)

Figure 18. Angle Bracket Attachment and Foundation Details

CONCRETE PAD OPTION
WITH ½” ANCHOR BOLTS (NOT INCLUDED)

STEEL SKID OPTION
WITH ¼” TEKS SCREW (NOT INCLUDED)

SECTION B–B
# 6. Appendix

## 6.1. Wide-Corr® Hopper Ladder Make-Up Packages

### Table 6. Wide-Corr® Hopper Ladder Make-Up Packages

<table>
<thead>
<tr>
<th>HOPPER MAKE-UP PACKAGES</th>
<th>MODEL</th>
<th>LADDER SECTION</th>
<th>STANDARD CAGE HOOP</th>
<th>CAGE – 48° VERTICAL BAR BUNDLE</th>
<th>CAGE – 40° VERTICAL BAR BUNDLE</th>
<th>CAGE – 44° VERTICAL BAR BUNDLE</th>
<th>CAGE – 30° VERTICAL BAR BUNDLE</th>
<th>SC CLIP</th>
<th>FOUNDATION BRACKET</th>
<th>HARDWARE PKG</th>
</tr>
</thead>
<tbody>
<tr>
<td>234500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>234501</td>
<td>14' x 35°</td>
<td>3 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>234531</td>
<td>15' x 35°</td>
<td>3 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>234502</td>
<td>16' x 35°</td>
<td>3 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>234532</td>
<td>18' x 35°</td>
<td>3 2</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>234503</td>
<td>19' x 35°</td>
<td>3 4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>234504</td>
<td>21' x 35°</td>
<td>4 4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>234505</td>
<td>24' x 35°</td>
<td>4 4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>234535</td>
<td>27' x 35°</td>
<td>4 4</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>234536</td>
<td>15' x 45°</td>
<td>4 4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>234537</td>
<td>18' x 45°</td>
<td>4 4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>234538</td>
<td>21' x 45°</td>
<td>4 4</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>234586</td>
<td>27' x 40°</td>
<td>5 6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Table 7. Wide-Corr® Hopper Ladder Make-Up Packages (cont’d)

<table>
<thead>
<tr>
<th>HOPPER MAKE-UP PACKAGES (Continued)</th>
<th>14' x 35° LADDER SUPPORT</th>
<th>15' x 35° LADDER SUPPORT</th>
<th>16' x 35° LADDER SUPPORT</th>
<th>18' x 35° LADDER SUPPORT</th>
<th>19' x 35° LADDER SUPPORT</th>
<th>21' x 35° LADDER SUPPORT</th>
<th>24' x 35° LADDER SUPPORT</th>
<th>27' x 35° LADDER SUPPORT</th>
<th>15' x 45° LADDER SUPPORT</th>
<th>18' x 45° LADDER SUPPORT</th>
<th>21' x 45° &amp; 24' x 40° LADDER SUPPORT</th>
<th>27' x 40° LADDER SUPPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>234487</td>
<td>234488</td>
<td>234489</td>
<td>234490</td>
<td>234491</td>
<td>234492</td>
<td>234494</td>
<td>234495</td>
<td>234526</td>
<td>234527</td>
<td>234528</td>
<td>234483</td>
<td></td>
</tr>
<tr>
<td>234481</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>234531</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>234482</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>234532</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>234483</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>234533</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>234484</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>234485</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>234536</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>234537</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>234538</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>234486</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.2. Optional Vertical Support Ladder Details

Table 9. 234569 Vertical Ladder Support Chart For 21’ Diameters or Less

<table>
<thead>
<tr>
<th>Hopper Size</th>
<th># of Legs</th>
<th>Hopper Ht (ft)</th>
<th>Rows of Supports</th>
<th>Needed For Ladder Configuration</th>
<th>Needed For Span Between 2 Legs</th>
<th>Needed For Span Between 3 Legs</th>
<th>Needed For Circular Stairs Configuration</th>
<th>Curved Stair Packages For Hopper Bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unstiffened SSK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15’ Dia</td>
<td>6</td>
<td>9.3</td>
<td>2</td>
<td>4</td>
<td></td>
<td>2</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>18’ Dia</td>
<td>8</td>
<td>10.7</td>
<td>2</td>
<td>4</td>
<td></td>
<td>2</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>21’ Dia</td>
<td>12</td>
<td>12.2</td>
<td>3</td>
<td>6</td>
<td></td>
<td>2</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Stiffened SSK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15’ Dia</td>
<td>10</td>
<td>9.2</td>
<td>2</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>18’ Dia</td>
<td>12</td>
<td>10.6</td>
<td>2</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>21’ Dia</td>
<td>14</td>
<td>12.1</td>
<td>3</td>
<td>3</td>
<td></td>
<td>1</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Welded</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14’ Dia</td>
<td>6</td>
<td>6.6</td>
<td>1</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>15’ Dia</td>
<td>6</td>
<td>7.2</td>
<td>1</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>15’ Dia</td>
<td>7</td>
<td>7.2</td>
<td>1</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>16’ Dia</td>
<td>8</td>
<td>7.8</td>
<td>2</td>
<td>4</td>
<td></td>
<td>2</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>18’ Dia</td>
<td>9</td>
<td>8.0</td>
<td>2</td>
<td>4</td>
<td></td>
<td>2</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>19’ Dia</td>
<td>9</td>
<td>8.4</td>
<td>2</td>
<td>4</td>
<td></td>
<td>2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>19’ Dia</td>
<td>11</td>
<td>8.4</td>
<td>2</td>
<td>4</td>
<td></td>
<td>2</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>21’ Dia</td>
<td>11</td>
<td>9.1</td>
<td>2</td>
<td>4</td>
<td></td>
<td>2</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>21’ Dia</td>
<td>13</td>
<td>9.1</td>
<td>2</td>
<td>4</td>
<td></td>
<td>2</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Commercial Hoppers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15’ Dia</td>
<td>10</td>
<td>9.9</td>
<td>2</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>18’ Dia</td>
<td>12</td>
<td>11.4</td>
<td>3</td>
<td>3</td>
<td></td>
<td>1</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>21’ Dia</td>
<td>14</td>
<td>13.0</td>
<td>3</td>
<td>3</td>
<td></td>
<td>1</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>
Table 10. 234568 Vertical Ladder Support Chart For 24' Diameters or Greater

<table>
<thead>
<tr>
<th>Hopper Size</th>
<th># of Legs</th>
<th>Hopper Ht (ft)</th>
<th>Rows of Supports</th>
<th>Needed For Ladder Configuration</th>
<th>Needed For Span Between 2 Legs</th>
<th>Needed For Span Between 3 Legs</th>
<th>Needed For Circular Stairs Configuration</th>
<th>Curved Stair Packages For Hopper Bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td>24' Dia</td>
<td>16</td>
<td>11.9</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>1-235384, 1-235393</td>
</tr>
<tr>
<td>27' Dia</td>
<td>18</td>
<td>13.2</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>1-235384, 1-235393</td>
</tr>
<tr>
<td>Welded</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24' Dia</td>
<td>12</td>
<td>10.4</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>8</td>
<td>1-235384</td>
</tr>
<tr>
<td>Commercial Hoppers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24' Dia</td>
<td>16</td>
<td>14.5</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>1-235382, 1-235384</td>
</tr>
<tr>
<td>27' Dia</td>
<td>18</td>
<td>13.9</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>1-235384, 1-235382</td>
</tr>
<tr>
<td>30' Dia</td>
<td>20</td>
<td>15.1</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>8</td>
<td>1-235382, 1-235384</td>
</tr>
<tr>
<td>33' Dia</td>
<td>22</td>
<td>15.2</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>8</td>
<td>1-235382, 1-235384, 1-235393</td>
</tr>
<tr>
<td>36' Dia</td>
<td>24</td>
<td>16.4</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>8</td>
<td>1-235382, 1-235384, 1-235393</td>
</tr>
</tbody>
</table>

- Hoppers with diameters of 21’ or smaller use the 234569 ladder support
- Hoppers with diameters of 24’ or larger use the 234568 ladder support
- Use the vertical ladder charts to identify the quantity of ladder supports needed to span between hopper legs
- Two ladder supports need to be overlapped and connected together with at least two self drilling screws for spans greater than 60”
- Bottom set of vertical ladder support spans between 3 legs; all sets of vertical ladder supports above span between 4 legs.
- Please see Curved Stair Installation Manual for further installation details of curved stairs
- Please see Wide-Corr® Ladder Installation Manual for further installation details of vertical ladders

Figure 19. Ladder Configuration (Featuring ISO View of the Assembly)
Figure 20. Circular Stair Configuration (Featuring ISO View of the Assembly)

Both drawings feature an ISO view of each assembly - Hoppers with diameters of 21’ or smaller will use the 234569 Ladder Support (LS) - Hoppers with diameters of 24’ or larger will use the 234568 LS - Use the Vertical Ladder charts to identify the quantity of LS needed to span between Hopper Legs - Two LS need to be overlapped and connected together with at least 2 selfdrilling screws for spans greater than 60” - Please see Curved Stair Installation Manual for further installation details of curved stairs - Please see Wide Corr Ladder Installation Manual for further installation details of vertical ladders
6.3. Ladder Parts Identification

- 234161 - Standard Ladder Cage Hoop
- 234162 - Bottom Ladder Cage Hoop
- 234163 - Top Ladder Cage Hoop
- 234166 - Ladder Cage Brace (45-3/16" Long)
- 234501 - Ladder to Wall Clip
- 234504 - Ladder Support Arm (1" Dia x 34-3/4" Long)
- 234505 - Ladder Pass Thru Rail
- 234514-16 - Ladder Cage Support
- 234517 - Ladder Support Arm Clip
- 234518 - Ladder Support Arm Bracket
- 234519 - Interior Ladder to Wall Clip
- 234558 - Ladder Block-off Hinge
- 234650 - Wind Reinforcement Brace

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>&quot;L&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>234514</td>
<td>48&quot;</td>
</tr>
<tr>
<td>234515</td>
<td>40&quot;</td>
</tr>
<tr>
<td>234516</td>
<td>44&quot;</td>
</tr>
</tbody>
</table>
7. Limited Warranty: Westeel Grain Bin Products

Westeel – Ag Growth International ("Westeel") warrants products that it has manufactured and/or that are branded with its name (the "goods") subject to the following terms and limitations, (the "warranty"): 

Duration of Warranty

This warranty will run from the date of purchase from the dealer or distributor, authorized by Westeel. The duration of the warranty is limited as follows:

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Warranty Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galvanized Bins</td>
<td>5 years</td>
</tr>
<tr>
<td>EasyFlow2</td>
<td>24 months</td>
</tr>
<tr>
<td>Westeel Fans</td>
<td>36 months</td>
</tr>
<tr>
<td>Floors</td>
<td>12 months</td>
</tr>
<tr>
<td>Catwalk</td>
<td>12 months</td>
</tr>
<tr>
<td>Bulk Feed Tanks</td>
<td>24 months</td>
</tr>
<tr>
<td>SeedStor-K Cones</td>
<td></td>
</tr>
<tr>
<td>Paint</td>
<td>12 months</td>
</tr>
<tr>
<td>Structural</td>
<td>30 months</td>
</tr>
<tr>
<td>Elite Cones</td>
<td></td>
</tr>
<tr>
<td>Paint</td>
<td>30 months</td>
</tr>
<tr>
<td>Structural</td>
<td>10 years</td>
</tr>
<tr>
<td>WESTEEL Cones</td>
<td></td>
</tr>
<tr>
<td>Paint</td>
<td>No Warranty</td>
</tr>
<tr>
<td>Structural</td>
<td>12 months</td>
</tr>
<tr>
<td>Smooth Wall Bins</td>
<td></td>
</tr>
<tr>
<td>Paint</td>
<td>60 months</td>
</tr>
<tr>
<td>Structural</td>
<td>10 years</td>
</tr>
<tr>
<td>Commercial Smooth Wall Bins</td>
<td></td>
</tr>
<tr>
<td>Paint</td>
<td>12 months</td>
</tr>
<tr>
<td>Structural</td>
<td>10 years</td>
</tr>
</tbody>
</table>

Limitation of Remedies Replacement

Within the warranty period, Westeel will replace the goods and/or original manufactured components thereof which are found, to Westeel's satisfaction, to be defective. Westeel is not responsible for direct, indirect, special, consequential, or any other damages of any kind, including personal injury to any individual, howsoever caused, including caused by transportation of the goods for repair or replacement.
Procedure for Obtaining Service
In the event of a warranty claim, the purchaser must complete any and all information required by Westeel in order to properly assess or investigate the claim. Westeel will not be responsible for the removal of any of the goods found to be defective, or transportation charges to and from Westeel’s authorized dealer or distributor, or for installation of any replacement goods and/or parts furnished under the warranty.

Limitations as to Scope of Warranty
The warranty does not extend to defects or damage caused, in whole or in part, by:
1. use of a kind and/or to a degree not reasonably expected to be made of the goods;
2. improper storage of the goods both prior to and after purchase;
3. damage caused by, or in the course of, installation or assembly;
4. any use of the goods which is not an intended use as specified in Westeel's published product literature, or otherwise specified by Westeel in writing;
5. any equipment attached to or used in conjunction with the goods;
6. any field modifications or substitutions to original bin components;
7. inadequate ventilation or any other circumstance not in keeping with proper maintenance and/or use of the goods;
8. Acts of God, accident, neglect or abuse of the goods by the purchaser and/or any other individual or entity; or
9. Any use or installation inconsistent with Westeel’s Standard Disclaimers.

Limitations as to Manufacturer
The warranty does not cover products sold by Westeel that are not manufactured by Westeel. In those circumstances, the purchaser is referred to the manufacturer of those products.

Limitation of Implied Warranties and Other Remedies
To the extent allowed by law, neither Westeel nor its dealers, nor any company affiliated with Westeel makes any warranties, representations, or promises as to the quality, performance, or freedom from defect of any Product covered by this Warranty.

WESTEEL HEREBY DISCLAIMS, TO THE EXTENT APPLICABLE, ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. A PURCHASER’S ONLY REMEDIES IN CONNECTION WITH THIS WARRANTY ARE THOSE SET FORTH IN THIS WARRANTY. IN NO EVENT WILL WESTEEL, ITS DEALERS, OR ANY COMPANY AFFILIATED WITH WESTEEL BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES.

Some jurisdictions do not allow waivers of certain warranties, so the above waivers may not apply to you. In that event, any implied warranties are limited in duration to ninety (90) days from delivery of the products. You may also have other rights which vary from jurisdiction to jurisdiction.

Exclusive Warranty
This warranty is the only warranty provided by Westeel and all other warranties and/or commitments, whether express or implied and no matter by whom made, statutory or otherwise, are subsumed and replaced by it and are of no legal effect. If any provision of the warranty is held by a court of
competent jurisdiction to be void or unenforceable, in whole or in part, such provision shall be deemed severable and will not affect or impair the legal validity of any other provision of the warranty.