Appendix A – Field Overview and Specifications

Game Field Introduction

This document will provide BOM information and detailed specifications for the Official Competition Field.

Teams who do not need an “official” field should refer to the separate low-cost field guide for cost-reduction options. Teams assembling the full field should refer to the separate VEX Robotics Competition Change Up Field Build Instructions.

Please note: this field utilizes the VEX Competition Field Perimeter (278-1501) developed by VEX Robotics. Instructions and specifications for this field perimeter are available in a separate document and are important for the field assembly.

This document is divided up into four sections:

1. Field Overview
2. Field Bill of Materials
3. Field Specifications
4. Non-Standard Field Perimeter Guidelines

There is also an accompanying STEP file which can be imported into most 3D modeling programs (i.e. Inventor, Sketchup, Solidworks, etc). This 3D model shows the “official” setup of a VEX Robotics Competition – Change Up competition field, and also includes detailed models of individual field elements.

For additional game-play detail, please refer to the VEX Robotics Competition – Change Up competition manual.

For more information on reducing costs on unofficial field construction, refer to the accompanying “Low Cost Field” section located online at vexrobotics.com.
Field Overview

The game VEX Robotics Competition – Change Up is played on a 12ft x 12ft foam mat, surrounded by a sheet metal and polycarbonate perimeter, and divided in half by the tape Autonomous Line. Nine Goals are evenly spaced around the field perimeter and in the center of the field. Sixteen red and sixteen blue Balls are located around the field for use by Robots.

For more details and specific gameplay rules, please refer to the VEX Robotics Competition – Change Up competition manual.
Game Objects & Field Bill of Materials

All of these items are available for purchase from: www.vexrobotics.com.

Generic Field Elements – Reusable Each Year

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>278-1501</td>
<td>VRC Field Perimeter Frame &amp; Hardware</td>
</tr>
<tr>
<td>276-6905</td>
<td>VRC Anti-Static Field Tiles (18-pack)</td>
</tr>
<tr>
<td>275-1401</td>
<td>VRC VEXnet Field Controller</td>
</tr>
</tbody>
</table>

Official VEX Robotics Competition – Change Up Specific Elements

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Quantity per Full Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>276-6498</td>
<td>VRC 2020-2021 Game Element Kit</td>
<td>2</td>
</tr>
<tr>
<td>276-6499</td>
<td>VRC 2020-2021 Field Element Kit</td>
<td>2</td>
</tr>
</tbody>
</table>

Practice Elements

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>276-6498</td>
<td>VRC 2020-2021 Game Element Kit</td>
</tr>
<tr>
<td>276-6639</td>
<td>VRC 2020-2021 Scoring Element Kit</td>
</tr>
</tbody>
</table>
Field Specifications Introduction

This section will outline the specifications that are most important to teams designing a robot to compete in the VEX Robotics Competition – Change Up. Though many of the critical dimensions are included in this section, it may be necessary to consult the separate assembly guide and 3D CAD models of the field for an additional level of detail. If you can't find a dimension in the specifications, we include a full model of the field to “virtually” measure whatever dimension is necessary.

Field components may vary slightly from event to event. This is to be expected; teams will need to adapt accordingly. It is good design practice to create mechanisms capable of accommodating variances in the field and game pieces.

Note: Minor field repairs are permissible, provided that the repairs do not affect gameplay. Examples of minor field repairs include (but are not limited to) replacing broken PVC pipes or taping cracked plastic. Be sure to check the Official Q&A for specific examples or to get an official clarification.
Non-Standard Field Perimeter Guidelines

This section will outline the specifications that are most important to teams designing a Non-Standard Field Perimeter for a Remote Tournament.

Non-Standard Field Perimeters will vary. This is to be expected and should be minimized greatly by following the Non-Standard Field Perimeter Specifications and Requirements.

Non-Standard Field Perimeter Requirements

Inside square wall-to-wall dimensions must be:

\[ W = 140.5'' \pm 0.5'' (3568.7\pm12.7\text{mm}) \]

Field wall heights must fall within:

\[ H = 11.5'' (292.1\text{mm}) \text{ min to } 12.5'' (317.5\text{mm}) \text{ max} \]

Field wall thickness must fall within:

\[ T = 0.45'' (11.4\text{mm}) \text{ min to } 3.0'' (76.2\text{mm}) \text{ max} \]

Note: There may be specifics year to year that will require portions of the field walls to emulate official competition field dimensions to allow for field elements to function properly. Please take this into consideration when creating your own field perimeter.
Official VRC Field Tiles (278-1502 or 276-7175) are required for competition use.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>276-7175</td>
<td>VRC Anti-Static Full Field Tile Kit</td>
</tr>
<tr>
<td>276-6905</td>
<td>VRC Anti-Static Field Tiles (18-pack)</td>
</tr>
<tr>
<td>275-6904</td>
<td>VRC Anti-Static Field Tiles (4-pack)</td>
</tr>
</tbody>
</table>

Official VRC Game Objects and Field Elements are required for competition use.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Quantity per Full Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>276-6498</td>
<td>VRC 2020-2021 Game Element Kit</td>
<td>2</td>
</tr>
<tr>
<td>276-6499</td>
<td>VRC 2020-2021 Field Element Kit</td>
<td>2</td>
</tr>
</tbody>
</table>

All Goals and Game Objects must be visible to all spectators and volunteers.

If using the recommended DIY Field Perimeter (built out of PVC pipe and hardboard paneling) the side(s) of the field which face the audience (or camera) should be replaced with a transparent surface. The official Spare Competition Field Lexan panels (VEX SKU 275-1202) are a recommended way to inexpensively achieve this goal.

Field Elements and Game Objects must still be set up in accordance with Appendix A.

All dimensions and tolerances must be adhered to.

Rigid and durable attachment methods like bolts or wood screws are recommended for mounting Field Elements to Non-Standard Field Perimeters. Attachment methods can vary, but shall not introduce new functionality to the VRC game.

Note: Different Non-Standard Field Perimeters will require different ways of securing the Field Elements to the Non-Standard Field Perimeter. It is the team’s responsibility to verify that their Fields and Non-Standard Field Perimeters emulate the official VRC game set up as accurately as possible. This includes, but is not limited to, the number of anchor points, the method of attachment, and devices used for attachment.
The Non-Standard Field Perimeter Specifications and Requirements outline only what is required from a Non-Standard Field Perimeter build. If there is no dimension or specification in this document that will prohibit a certain material or build style, it will be considered legal for a Non-Standard Field Perimeter.
Balls are placed as follows before the start of each Match:
1. (1X) Red or Blue Ball for Preload into each Robot
2. (2X) Red balls placed adjacent to the Corner Goals on the Blue Alliance side of the field and placed at a diagonal towards the Middle Goal
3. (2X) Blue balls placed adjacent to the corner goals on the Blue Alliance side of the field and placed at a diagonal towards the Middle Goal
4. (2X) Balls centered between the tiles on either side placed adjacent to the middle Goal
5. (4X) Balls along the Autonomous Line
6. (3X) Opposing color Balls placed inside the Home Row Wall Goals placed with the opposing alliance color on top
7. (3X) Balls placed in the Wall goal on Audience View side with the pattern Blue, Red, Blue
8. (3X) Balls placed in the Wall goal opposite the Audience View side with the pattern Red, Blue, Red
Match Object Placement:
Robot Skills Match Object Placement

ALL DIMENSIONS ARE IN INCHES.
Field Critical Specs:

Field Critical Dimensions:
- ~140.5" Square Wall to Wall, Inside
- 11.50" Wall Height
- 1.27" Wall Thickness

NOTE:
Some events may elect to use Techspray 1726-QT, or a suitable replacement, to prevent static buildup on the foam tiles.
Ball Specs:

Ball Mass: 168 ± 10 Grams

̴ 6.30 ± 0.1

1.37
Wall Goal Specs:

\( \phi 10.12 \) Pipe Circle Diameter

\( \phi 7.02 \) ID

\( \phi 11.29 \) OD

From field perimeter

GROUND

25.41

18.41

13.25

8.09

0.98 Typ.

6.13 \( +0.50 \), \( 0.00 \)

11.56

8.0

6.31

0.84
Middle Goal Specs:

Φ 10.12
Pipe Circle Diameter

Φ 11.29 OD

Φ 7.02 ID

0.98 Typ.

6.50 +0.50
0.00

8.47

13.44

18.41

GROUND

ALL DIMENSIONS ARE IN INCHES.
Corner Goal Specs

\[ \phi 11.29 \text{ OD} \]

From Field Perimeter

\[ \phi 10.12 \text{ Pipe Circle Diameter} \]

\[ \phi 7.02 \text{ ID} \]

ALL DIMENSIONS ARE IN INCHES.
Corner Goal Specs

Note: Option A: 1x 4" Standoff (276-1021) or Option B: 2x 11" Zipties (275-0125) are added to aid in proper function of the goal.

As per the May 25th Game Manual Update, either option A or B is required, with option A being preferred.

Note: Shown is the acceptable range of the 2x 11" Zipties.