CAUTION: ALL BLOOD PRODUCTS SHOULD BE TREATED AS POTENTIALLY INFECTIOUS. THE PACKAGING OF THIS PRODUCT (DROPPER BULBS) CONTAINS DRY NATURAL RUBBER.

Intended Use:
Referencells (Pooled Cells) are intended for use in tube and microplate ABO serum grouping tests.

Summary of the Test:
Because of the importance of the ABO groups in transfusion, serum or reverse grouping, employing cells of known ABO groups, is used as an adjunct to red blood cell or forward typing (using Anti-A and Anti-B). As a minimum, serum grouping tests must employ at least A and B red blood cells to detect the anti-A or anti-B. Additional serum grouping red blood cell reagents can be used to resolve serum and red blood cell grouping discrepancies. A and B red blood cells are most commonly used to identify anti-A in the sera of group A people. Group O red blood cells are used to identify agglutination due to non-ABO antigens.

Principle of the Test:
The ABO system is the only blood group system where persons, older than 6 months of age, consistently and predictably produce antibodies to antigens that they lack. As a consequence, ABO grouping is performed with serum as well as red blood cells. Serum is systematically tested against Referencells reagent red cells. Agglutination of A or B red blood cells to detect the anti-A or anti-B. Additional serum grouping red blood cell reagents can be used to resolve serum and red blood cell grouping discrepancies. A and B red blood cells are most commonly used to identify anti-A in the sera of group A people. Group O red blood cells are used to identify agglutination due to non-ABO antigens.

Reagents:
Referencells - 4 is a four-vial set of one vial each of A1, A2, B and O cells.
Referencells - 2 is a two-vial set of A and B cells.
Referencells - 1 is a single vial reagent of A cells.

Each cell vial contains a 2-4% suspension of pooled C-D-E- red blood cells suspended in a buffered preservative solution containing adenosine and adenine to retard hemolysis and/or loss of antigenicity during the dating period. EDTA is added to inhibit complement activation and to prevent hemolysis when red blood cells are tested with fresh serum. Chloramphenicol (0.25 mg/mL), neomycin sulfate (0.1 mg/mL), and gentamicin sulfate (0.05 mg/mL) are added as preservatives. The diluent does not interfere with complement mediated hemolysis. No US standard of potency.

Precautions:
For in vitro diagnostic use.

Store at 1-10°C when not in use. Do not freeze or expose to elevated temperatures. Avoid contaminating this product during use. Contamination will adversely affect the product's performance during its shelf life. Do not use contaminated reagents. Do not use beyond the expiration date. Do not use leaking vials. Do not use unlabeled vials. The format for the expiration date is expressed as CCYY-MM-DD (year-month-day).

Suspend red blood cells before use by gently inverting each vial several times. Reagent red blood cells should not be used if the red blood cells darken, spontaneously clump, or if there is significant hemolysis. Slight hemolysis may occur with age. In this instance, the red blood cells may be washed and suspended in saline immediately prior to use.

NOTE: Washing will remove the EDTA contained in the diluent. Thus, Referencells that are washed before testing may hemolyze in fresh sera that contain hemolytic anti-A or anti-B.

Handle and dispose of the reagent red blood cells as if potentially infectious. CAUTION: ALL BLOOD PRODUCTS SHOULD BE TREATED AS POTENTIALLY INFECTIOUS. SOURCE MATERIAL FROM WHICH THIS PRODUCT WAS DERIVED WAS FOUND NEGATIVE WHEN TESTED IN ACCORDANCE WITH CURRENT FDA REQUIRED TESTS. NO KNOWN TEST METHODS CAN OFFER ASSURANCE THAT PRODUCTS DERIVED FROM HUMAN BLOOD WILL NOT TRANSMIT INFECTIOUS AGENTS. THE PACKAGING OF THIS PRODUCT (DROPPER BULBS) CONTAINS DRY NATURAL RUBBER.

Specimen Collection and Preparation:
Draw a blood specimen using an acceptable phlebotomy technique. In manual tests, or in tests using semiautomatic instruments, fresh serum or plasma (EDTA, heparin, ACD, CPD, CPDA-1, CP2D) may be used. Testing should be performed as soon as possible following collection to minimize the chance that falsely positive or falsely negative reactions will occur due to improper storage or contamination of the specimen. Should delays in testing occur, specimens should be stored at 1-10°C if possible. Alternatively, serum or plasma can be separated from red blood cells and stored frozen. Weakly reactive antibodies may deteriorate and become undetectable in samples stored at room temperature for several days before testing or in samples stored for prolonged periods at 1-10°C. Do not use samples drawn into tubes with neutral gel separators. False-positive results may occur with such samples.

Procedure:
Materials Provided:
Referencells in dropper vials ready for use
Additional Materials Required:
All methods:
1. Donor or patient sample
2. Marking pens
Tube methods:
1. 10 x 75 mm or 12 x 75 mm test tubes and a test tube rack
2. Transfer pipettes
3. Serological centrifuge*
4. Interval timer
5. Isotonic saline or phosphate-buffered (approximately 15 mM) isotonic saline, pH 6.5-7.5
Microplate or microwell methods:
1. Transfer pipettes or pipetting system*
2. Microplates, microwells or Immucor Hemagglutination/Dilution Strips
3. Centrifuge* 
4. Isotonic saline or phosphate-buffered (approximately 15 mM) isotonic saline, pH 6.5-7.5
5. Mechanical microplate shaker* (optional)
6. Microplate reader* (optional)
7. Galileo* (as applicable)
8. Galileo Echo* (as applicable)
9. Echo Lumen* (as applicable)
10. NEO Iris* (as applicable)

Key:
Underline = Addition or significant change; ▲ = Deletion of text
**It is the users responsibility to validate an accessory device for its intended use. Validation results should be maintained as part of the laboratory’s records for review by regulatory agencies.**

**Tube Test Method:**
1. Label 1 test tube for each of the Referencells to be tested.
2. Add 2 drops of serum or plasma to each tube.
3. Gently invert each reagent several times to completely suspend the red blood cells.
4. Add 1 drop of each reagent to the appropriately labeled tubes. Mix the contents of each tube thoroughly.
5. Centrifuge each tube.* Gently suspend each red blood cell button and examine for agglutination. Record results.**

* Suggested centrifugation time: 15-30 seconds at 300-1000 x g or a time, appropriate for the centrifuge used, that produces the strongest reaction of antibody with antigen-positive red blood cells, yet allows easy suspension of antigen-negative red blood cells.

**Room temperature incubation for 5-60 minutes may be necessary to enhance reactions due to weakly reactive ABO antibodies.**

**Microplate Method:**
1. Label the plate or strip to be tested.
2. Gently invert each reagent several times to completely suspend the red blood cells.
3. Add 25-50 uL (± 5 uL) of each Referencells to separate wells.
4. Gently invert each reagent several times to completely suspend the red blood cells.
5. Centrifuge the tests at 150-250 x g for 60 seconds, or for an appropriate time and speed to produce positive results with antibody-positive serum or plasma and negative results with antibody-negative serum or plasma.
6. Agitate the wells to suspend the cell buttons by manually tapping the plate or with a microplate shaker.
7. Centrifuge the tests at 150-250 x g for 60 seconds, or for an appropriate time and speed to produce positive results with antibody-positive serum or plasma and negative results with antibody-negative serum or plasma.
8. Examine the reactions in each well, if desired. (An optical aid can be used to examine the reactions in each well, if desired.)

* Room temperature incubation for 5-60 minutes may be necessary to enhance reactions due to weakly reactive ABO antibodies.

For microplate testing with automated instrumentation, including isohemagglutinin titers, refer to instructions provided in the instrument operator manual.

**Stability of Reaction:**
Following centrifugation, all tests should be read immediately and results interpreted without delay. Delays may result in dissociation of antigen-antibody complexes leading to falsely negative, or at most, weakly positive reactions. Microplate tests should be interpreted immediately following resuspension to avoid erroneous test results due to the settling or dissociation of red cell agglutinates.

**Quality Control:**
To confirm the reactivity of the A1, A2 and B red blood cells, it is recommended they be tested each day of use with the appropriate weakly reactive ABO antibody. Lack of reactivity indicates a reagent is not suitable for use.

For microplate testing with automated instrumentation, refer to instructions provided in the instrument operator manual.

**Interpretation of Results:**
Positive test: agglutination of red blood cells
Negative test: no agglutination

**EXPECTED SERUM GROUPING RESULTS**

<table>
<thead>
<tr>
<th>Blood Group</th>
<th>Reagent Red Blood Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A1</td>
</tr>
<tr>
<td>O</td>
<td>+</td>
</tr>
<tr>
<td>A1</td>
<td>0</td>
</tr>
<tr>
<td>A2</td>
<td>0</td>
</tr>
<tr>
<td>A2 with anti-A1</td>
<td>+</td>
</tr>
<tr>
<td>B</td>
<td>+</td>
</tr>
<tr>
<td>A1B</td>
<td>0</td>
</tr>
<tr>
<td>A1B with Anti-A1</td>
<td>+</td>
</tr>
</tbody>
</table>

Key:
Underline = Addition or significant change; ▲ = Deletion of text

**Limitations:**
Falsely positive or falsely negative test results can occur form bacterial or chemical contamination of test materials, inadequate incubation time or temperature, improper centrifugation, or omission of sample or reagent.

Reagent A1, A2 and B red blood cells possess antigens other than A or B. It is possible that on occasion a particular serum will contain a saline phase agglutinin defining one of these antigens. Non-ABO-related agglutination may interfere with serum grouping tests. Direct agglutination of a negative control (group O red blood cells) by a test sample suggests that the agglutination of A or B cells with the sample should be further investigated.

Referencells Group O red blood cells (Pooled Cells) DO NOT MEET THE REQUIREMENTS OF THE FDA for reagent red blood cells intended for antibody screening for unexpected antibodies.

Negative reactions may be obtained with one or more reagent red blood cells if the sample contains antibodies in concentrations that are too low to be detected by the test method employed. Decreased antibody activity to A and B antigens has been reported with samples from debilitated or elderly patients or patients who are less than 6 months old.

The ABO antibodies of most group A, B or O adults agglutinates A1, A2 and B cells strongly (3-4+). Reactions of 2+ or less may indicate the reaction is due to an antibody other than anti-A or anti-B. Thus, weakly positive reactions should be evaluated carefully to ensure no ABO discrepancy exists and the correct ABO group is assigned.

Umbilical samples may contain maternal anti-A and/or anti-B and will not give reliable serum grouping results.

Infrequently, falsely positive results may occur in the presence of antibodies directed to components of the red blood cell diluent. These unwanted reactions can usually be avoided by utilizing reagent red blood cells that have been washed with saline prior to testing.

With reference to the microplate method, new and unused plastic microplates are capable of passively adsorbing cells and serum proteins to their surfaces. This nonspecific adsorption can lead to erroneous test results. To overcome this characteristic, microplates should be treated prior to use to block nonspecific adsorption. Immucor Hemagglutination/Dilution Strips are pretreated by the manufacturer and require no further treatment.

The reactivity of Reagent Red Blood Cells may diminish over the dating period. The rate at which antigen reactivity (ie, agglutinability) is lost is partially dependent upon the individual donor characteristics that are neither controlled nor predicted by the manufacturer.

US license does not apply to the group O control cell.

For isohemagglutinin (anti-A and anti-B) titers, the clinical interpretation and significance of the cut-off must be established by the user.

**Specific Performance Characteristics:**
Prior to release, each lot of Immucor Referencells is tested with Anti-A, Anti-B and Anti-A1 lectin according to the insert method. The performance of this product is dependent upon adhering to the insert's recommended methodology. Each donor sample has been shown to be D-C-E-cE+ by two independent laboratories using no less than two donor sources of antibody. All suspensions are tested and shown to have a negative direct antiglobulin test using polyspecific anti-human globulin. For additional information or for technical support, contact Immucor at 855-IMMUCOR (466-8267).

The expiration date is set at 67 days from the date of manufacture which is the earliest date that blood is withdrawn from any donor used in a component of the product.

Performance Characteristics on Galileo Echo and Echo Lumen:
Method comparison studies were performed at four external clinical sites. Specimens were tested on Galileo Echo and/or Echo Lumen and Galileo Neo. Specimens that gave initial equivocal (?) test well results with Referencells were retested on the analyzer that gave the initial equivocal results. Test results were evaluated for agreement between analyzers. Combined results from all sites are summarized in the following tables:

Note: Agreement between methods does not indicate which method is correct.
**Results are for North America Market assays.** Galileo Echo testing performed with software v2.1. NPA lower 95% CI did not meet 99% due to 52 false-positive results. ABO serum (reverse) grouping results that are not concordant with ABO cell (forward) grouping results result in NTD (No Type Determine) interpretation.

<table>
<thead>
<tr>
<th>A Cells</th>
<th>Galileo Echo</th>
<th>Positive</th>
<th>Negative</th>
<th>Equivocal</th>
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</thead>
<tbody>
<tr>
<td>5344</td>
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<tr>
<td></td>
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<td>0</td>
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</table>

**Results are for North America Market assays.** NPA lower 95% CI did not meet 99% due to negative sample (N) size tested.

<table>
<thead>
<tr>
<th>A Cells</th>
<th>Galileo Neo</th>
<th>Positive</th>
<th>Negative</th>
<th>Equivocal</th>
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</thead>
<tbody>
<tr>
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<td>19</td>
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<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>Equivocal</td>
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<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Results are for North America Market assays.** Galileo Echo testing performed with software v2.1. NPA lower 95% CI did not meet 99% due to 27 false-positive results. ABO serum (reverse) grouping results that are not concordant with ABO cell (forward) grouping results result in NTD (No Type Determine) interpretation.

<table>
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<tr>
<th>B Cells</th>
<th>Galileo Echo</th>
<th>Positive</th>
<th>Negative</th>
<th>Equivocal</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td>Equivocal</td>
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</tr>
</tbody>
</table>

**Results are for North America Market assays.** Galileo Echo testing performed with software v2.1. NPA lower 95% CI did not meet 99% due to negative sample (N) size tested.

**Automated ABO Titration Assays**
Method comparison studies were performed at two external sites and at Immucor, Inc. as an internal site. Test results were compared for agreement between NEO Iris assays and Galileo NEO assays.

<table>
<thead>
<tr>
<th>Initial Results</th>
<th>Equal or within ±1 doubling-dilution</th>
<th>Equal or within ±2 doubling-dilutions</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>n</td>
</tr>
<tr>
<td>NEO Iris</td>
<td>102</td>
<td>84</td>
</tr>
<tr>
<td>Galileo Neo</td>
<td>102</td>
<td>84</td>
</tr>
</tbody>
</table>

*Agreement at the 95% one-sided lower confidence interval
Discordant samples were manually diluted and tested by a reference method.

<table>
<thead>
<tr>
<th>Bibliography:</th>
</tr>
</thead>
</table>