Task:

Imagine that you are working in a large chemical company in the product testing department. You have been assigned to create a test plan for a new experimental laundry detergent.

The detergent is marketed as follows:

A universal laundry detergent for all types of stains. Designed for automatic washing machines.

When developing the test plan, you are not limited in resources (amount of equipment and personnel).

Test plan

Washing powder “Fresh AF”

**Revision history**

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Version | Description | Author |
| 12.03.25 | 1.0 | Creation | Nikolay Ryzhkov |
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**Introduction**

The purpose of this Test Plan is to describe the process of testing the washing powder "Fresh AF". The document allows you to get an idea of ​​the planned work on testing the project.

The powder "Fresh AF" is positioned on the market as follows:

Universal washing powder for all types of dirt. Designed for automatic washing machines.

Development and testing will be conducted using the Agile methodology, ensuring continuous collaboration and improvement.

**Scope**

The purpose of testing is to check the following points:

- Collection and analysis of product requirements.

- Checking the powder's compliance with ISO standards (quality), ECOSERT (environmental friendliness) and compliance with REACH regulations (registration of chemical composition).

- Checking the powder's effectiveness in washing.

- Compatibility with different types of fabrics

- Testing compatibility with automatic washing machines

- Efficiency in different washing conditions

- Economy and powder consumption

- Durability testing

Test Items

Laundry Detergent "Fresh AF".

Features to be Tested

- Product Requirement Analysis.

- Check compliance with ISO standards (quality), ECOSERT (eco-friendliness), and REACH regulations (chemical composition registration).

- Effectiveness of Detergent During Washing.

Evaluate how well the detergent removes various types of stains (oil, wine, blood, grass, coffee, chocolate, etc.).

- Compatibility with Different Fabric Types.

Test the impact of the detergent on natural fabrics (cotton, linen, wool, silk) and synthetic fabrics. Evaluate fabric color retention and structure after multiple washes.

- Testing Compatibility with Automatic Washing Machines.

Check the solubility of the detergent under different washing modes. Ensure no residue remains in the dispenser or on clothes. Assess the impact on washing machine components (scale buildup, detergent residue).

- Effectiveness in Different Washing Conditions.

Test the detergent’s performance at various temperatures (30°C, 40°C, 60°C, 90°C).

Assess performance under different washing modes (with additional rinsing, without additional rinsing, with pre-soaking, without pre-soaking).

Evaluate effectiveness in hard and soft water.

- Economy and Detergent Consumption.

Determine the required amount of detergent for effective washing at different laundry volumes.

- Durability Testing.

Check how the detergent's properties change with long-term storage (clumping, loss of effectiveness).

Assess the packaging's resistance to external factors (moisture, mechanical damage).

**Features not to be tested**

- Hand wash.

- Interaction with conditioners and other detergents.

- Compatibility with industrial washing machines.

- Use in non-standard conditions (at extremely low or high temperatures).

- Aroma and its perception.

- Packaging design.

- Effective against specific chemical contaminants (oil products, paints, toxic substances).

- Long-term impact on washing machines.

**Approach**

The testing process will include:

- functional testing to check the effectiveness of washing different types of dirt on different fabrics, compatibility with automatic washing machines, and effectiveness in different washing conditions.

- non-functional testing to verify requirements, powder compliance with ISO (quality), ECOSERT (environmental friendliness) and REACH (chemical composition registration) regulations, powder economy and consumption, durability testing.

Initial tests when developing a new version of a product (e.g. a new chemical composition) will be smoke testing to check the powder's compliance with ISO standards (quality), ECOSERT (environmental friendliness) and compliance with REACH regulations (registration of the chemical composition). If the product does not meet these requirements, then its entry into the market and use by end consumers will be impossible. Which makes further testing of the product properties useless. This type of testing will also be part of Regression Testing.

Functional testing will be performed using the black box method from the end user's perspective. Non-functional testing will be performed using the white box method by appropriate chemistry experts.

**Item Pass/Fail criteria**

|  |  |  |
| --- | --- | --- |
| Test | Pass criteria | Fail criteria |
| Requirements Analysis | The requirements meet all the necessary attributes (correctness, testability, verifiability, completeness, unambiguity, consistency, priority, atomicity, modifiability, traceability) | Ideally, at least one of the attributes does not match |
| ISO Compliance | Fully compliant | Doesn't meet standards |
| User safety | Does not cause allergic reactions, burns, or irritation of the respiratory tract | May cause allergic reaction or burns or irritation of the respiratory tract |
| Washing efficiency (different washing machines, different fabrics, different modes) | After washing >= 90% of dirt removed | After washing, < 90% of dirt was removed |
| Compatibility with different types of fabrics | After 10 washes, the structure of the fabric and its color remain unchanged | After 10 washes, the structure of the fabric and its color visually change |
| Testing compatibility with automatic washing machines | After washing, there are no visible traces of powder left on the drum or washed clothes | After washing, visible traces of powder remain on the drum and washed clothes |
| Testing efficiency and powder consumption | Determining the amount of powder required to remove >= 90% of contaminants | It is not possible to determine the amount of powder required to remove >= 90% of contaminants |
| Durability testing | After a week of keeping a closed package of powder in a room with humidity above 60%, its structure does not change (it does not stick together or crystallize) | After a week of keeping a closed package of powder in a room with humidity above 60%, its structure changes (it sticks together, crystallizes) |

**Test deliverables**

Testing will provide specific deliverables during the project. These deliverables fall into three basic categories: Documents, Test Cases / Bug Write-ups, and Reports.

Documents

Test plan

Test Cases / Bug Write-ups

Test Cases / results

Test Coverage reports

Bug tracker for bug reports

Reports

Test result reports

Test final report

**Environment needs**

The following resources will be required to conduct the testing:

The product to be tested in the required quantity.

Equipment and reagents for chemical analysis.

Specialists in the field of chemistry and chemical analysis, familiar with the requirements of standardization and certification.

Automatic washing machines of at least three price categories (cheapest, mid-range and premium) with connections that enable their use.

Fabric samples.

Natural: cotton, linen, wool, silk, bamboo.

Synthetic: polyester, nylon, acrylic, elastane, microfiber.

Mixed: polycotton, viscose, denim. Образцы загрязнений:

Biological: sweat and bone fat, blood, dirt, dust, grass, animal urine.

Food: coffee, tea, red and white wine, fat, chocolate, fruits and berries (strawberries, cherries, blueberries), sauces (ketchup, mustard, soy sauce, mayonnaise). Chemical: cosmetics (lipstick, foundation, powder), deodorants and antiperspirants, ink (ballpoint pen, fountain pen, marker).

**Responsibilities**

|  |  |  |
| --- | --- | --- |
| Role | Tasks | Full name |
| Project Manager, PM | Test management at all stages.  Determining deadlines, budgets and resources.  Coordinating work between teams (R&D, testing, marketing).  Making decisions on product release based on test results.  Interaction with government certification bodies. |  |
| Lead Tester / Test Manager | Developing a general testing strategy.  Determining the necessary test cases and testing methods.  Distributing tasks between team members.  Controlling test execution and analyzing results.  Preparing reports and recommendations for improving product quality. |  |
| Lab Testers | Conducting chemical tests.  Analysis of the reaction of washing powder with different materials.  Testing the hypoallergenicity of the powder.  Studying the effect on the skin (irritation, allergy).  Conducting safety tests (environmental friendliness, flammability). |  |
| Functional Testers | Testing the efficiency of removing different types of dirt.  Evaluation of washing results at different temperatures.  Testing powder on different types of fabric.  Analysis of the effect of powder on fabric color (fading, loss of brightness).  Testing compatibility with different automatic washing machines. |  |
| Environmental and certification specialists | Assessment of the environmental friendliness of the powder (biodegradability, toxicity).  Preparation of documents for certification (ECO, GOST, ISO, FDA, EU).  Verification of compliance with international and national standards. |  |

**Schedule**

|  |  |  |  |
| --- | --- | --- | --- |
| **Stage** | **Activities** | **Responsible** | **Expected timing** |
| **REQUIREMENTS ANALYSIS** | | | |
| REQUIREMENTS ANALYSIS | Study of powder composition, determination of key characteristics to be tested, determination of testing types, priorities, determination of test environment. | QA Lead, Chemists | 1 week |
| **TEST PLANNING** | | | |
|  | Preparing a test plan.  Selecting testing tools, defining roles and responsibilities. | QA Lead, QA Team | 1 week |
| **TEST CASES CREATION** | | | |
|  | Developing test cases for efficiency, safety, compatibility | QA Team | 1 week |
| **TEST ENVIRONMENT SETUP** | | | |
|  | Purchase of test materials (fabrics, materials for contamination, washing machines). | Logistics, Procurement | 1 week |
|  | Setting up a test lab (Preparing equipment, setting up testing conditions) | QA Engineers, electricians, plumbers | 1 week |
| **TEST EXECUTION** | | | |
| Compliance Testing | ISO Compliance Testing | Chemists | 3 days |
| Safety Testing | User Safety Testing | Chemists | 3 days |
| Functional testing | Testing washing efficiency (different washing machines, different fabrics, different modes).  Testing compatibility with different types of fabrics.  Testing compatibility with automatic washing machines. | QA Team | 2 weeks |
| Not functional testing | Testing of efficiency and powder consumption.  Testing of storage conditions. | QA Team | 1 week |
| **TEST CLOSURE** | | | |
| Analysis of results and reporting | Summarizing data, forming recommendations | QA Lead, Analysts | 1 week |
| Final statement | Presentation of results to management | QA Lead, Product Manager | 1 week |

**Risk and contingencies**

**1. The chemical composition does not meet safety standards.**

**Risk: The powder contains prohibited or harmful substances, has not been certified according to ISO, GOST or other regulations.**

**Corrective measures:**

- Conduct laboratory tests for toxicity and allergenicity.

- Compare the composition with international standards (ISO 6330, REACH, EPA).

- If deviations are detected, revise the formula.

**2. Poor stain removal performance**

**Risk: Powder does not cope with certain types of stains or does not work well in cold water.**

**Remedy:**

- Conduct additional testing on different fabrics and temperatures.

- Select alternative active ingredients in the composition.

- Improve instructions for use (e.g. add soaking recommendations).

**3. Too much foam**

**Risk: Excessive foaming can cause damage to washing machines or reduced rinsing efficiency.**

**Remedy:**

- Conduct testing in different models of washing machines.

- Optimize the powder formula using defoamers.

- Add a warning on the packaging about the dosage.

**4. Powder residue after washing**

**Risk: Powder does not dissolve well, leaves marks on clothes or in the detergent compartment.**

**Remedy:**

- Check the solubility of the powder in water of different hardness and temperature.

- Add testing for rinsing efficiency.

- Change the granulation of the powder or increase its dispersibility.

**5. Harmful effects on fabrics**

**Risk: Powder damages the structure of fabrics, causing fading or shrinkage.**

**Remedial measures:**

- Test the product on natural and synthetic fabrics.

- Add colorfastness and shrinkage tests to the test plan.

- Make adjustments to the composition if problems are found.

**6. Negative impact on washing machines**

**Risk: Powder causes blockages, scale or corrosion of internal parts of machines.**

**Remedial measures:**

- Conduct long-term testing under real operating conditions.

- Check compatibility with different machine models.

- Include recommendations for regular machine maintenance.

**7. Allergic reactions in users**

**Risk: Consumers may develop a skin reaction to the powder.**

**Elimination measures:**

- Conduct dermatological tests.

- Develop a hypoallergenic formula.

- Place warnings about potential allergens on the packaging.

**8. Violation of environmental standards**

**Risk: Powder contains phosphates, surfactants or other substances harmful to the environment.**

**Elimination measures:**

- Check compliance with environmental safety standards (Ecolabel, EU Detergents Regulation).

- Develop a biodegradable formula.

- Indicate recommendations for safe disposal on the packaging.

**9. Packaging issues**

**Risk:** Powder cakes, packaging leaks or is inconvenient to use.

**Remedial measures:**

- Testing for tightness and ease of use.

- Testing for resistance to moisture and mechanical damage.

- Developing ergonomic packaging with precise dosing.

**Approvals**

Research and Development Department (R&D)

Quality Assurance (QA)

Marketing & Branding

Legal Department

Finance & Budgeting