# DEVELOPMENT OF INDUSTRIAL APRON USING TECHNICAL TEXTILE FABRICS

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## ABSTRACT

*The development of industrial Apron incorporating black melange and polyamide nylon 6,6 RFL (Resorcinol Formaldehyde Latex) dipped coatings represents a significant advancement in high-performance textile materials. The resulting fabric exhibits superior mechanical properties, including enhanced tensile strength, tear resistance, and dimensional stability This study focuses on the synthesis and characterization of nylon 6,6 fibers, which are renowned for their exceptional strength, durability, and resistance to abrasion, making them ideal for industrial applications.*

**Keywords**: *Technical Textile Fabrics, Polyamide Nylon 6,6, Resorcinol Formaldehyde Latex (RFL), Black Melange, Polyester-Cotton Melange, Protective Garments, RFL Dipping, Industrial Apron, High-Performance Textiles, Safety and Durability*

## 1.Introduction:

Industrial aprons are essential protective garments designed to safeguard workers from various occupational hazards, including chemical spills, abrasions, heat, and mechanical impacts. The development of high-performance industrial aprons requires the use of advanced materials that combine durability, comfort, and resistance to harsh environments. In this context, the integration of black melange fabric and polyester nylon 6,6 RFL (Resorcinol Formaldehyde Latex) dipped fabric offers a cutting-edge solution for creating aprons that meet the demanding requirements of industrial applications.

## 2. MATERIALS AND METHODOLOGY:

### 2.1 Materials:

The fabric used in this study was Polyester cotton Mélange fabrics with EPI 37, PPI 37 and GSM 262, Nylon 6,6 plain-woven fabrics with EPI 40, PPI 26 and GSM 126. This fabric was supplied by Southern Spinners and Processors, Dharmapuri District Tamil Nadu.

Resorcinol-formaldehyde-latex (RFL)

### 2.2 Methodology:

The fabric proposed for protective garments utilizes technical textile fabric and functional properties. It is made using PCM (polyester-cotton melange) and nylon 6,6. In this fabric, the weft direction is Nylon 6,6, and the warp direction is polyester. The fabric exhibits properties such as stretchability, elongation, and durability.

To enhance these properties, a chemical coating is applied to the nylon 6,6 fabric surface using RFL (Resorcinol Formaldehyde Latex). The RFL is prepared in a ratio of 1:2, for 1 hour at 80°C with the chemical concentration mixed into a solution. Fig.1. The fabric is then dipped into this chemical solution. After dipping, the fabric is passed through a hot steam chamber during the curing process to complete the RFL dipping process.

The methodology of this research process has been highlighted in the below flow chart

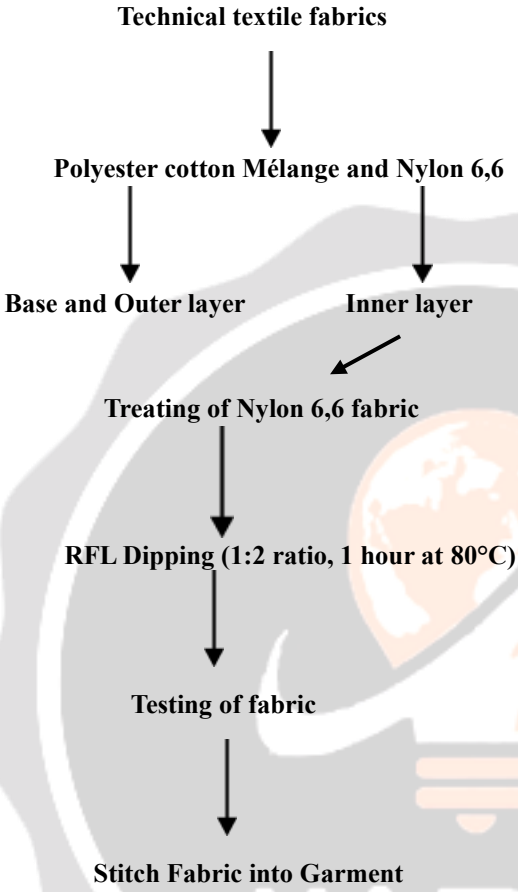


Fig.1 RFL (Resorcinol Formaldehyde Latex).

## 3. Statistical Analysis:

The apron prepared in three layers undergoes various tests as per ISO standards to evaluate its performance and durability. The following tests are conducted: dimensional stability, abrasion resistance, tearing strength, tensile strength, pilling resistance, stain Repellence, bursting strength, and air permeability.

### 3.1Tearing Strength

The fabric sample were tested for tear strength according to ISO-13937-1, Elmendorf tearing strength tester to measure the tear strength of fabric as per ASTM D-1424-96; This standard is specifically designed for testing woven fabrics, allowing accurate determination of their tensile properties.

### 3.2 Tensile Strength

The tensile strength of the samples, which was measured by the ravelled strip (20 cm × 5 cm) method. The tensile strength of fabric was tested as per ASTM D-5035 method.

### 3.3 Dimensional Stability (ISO 5077)

Measures fabric shrinkage or expansion after washing or exposure to specific conditions.

### 3.4 Abrasion Resistance (ISO 12947)

Evaluates fabric resistance to wear and tear caused by rubbing or friction.

**3.5 Pilling Resistance (ISO 12945):** Assesses fabric's tendency to form pills (small fiber balls) due to friction.

**3.6 Stain Repellence (ISO 14419):** Evaluates fabric's ability to resist and repel stains from liquids or substances.

**3.7 Bursting Strength (ISO 13938):** Measures the pressure required to rupture the fabric when subjected to force.

**3.8 Air Permeability (ISO 9237):** Determines the rate of airflow through the fabric, indicating breathability.

## 4.SUMMARY

The study focuses on the development of high-performance industrial aprons using technical textile fabrics, specifically incorporating black melange and polyamide nylon 6,6 with Resorcinol Formaldehyde Latex (RFL) coatings. The research aims to enhance the mechanical properties of the fabric, such as tensile strength, tear resistance, and dimensional stability, making it suitable for industrial applications where protection against harsh conditions is essential. The methodology involves using polyester-cotton melange fabric in the warp direction and nylon 6,6 in the weft direction, treated with RFL to improve durability and performance. Various tests, including tensile strength, abrasion resistance, and dimensional stability, were conducted according to ISO standards to evaluate the fabric's properties. The results indicate that the RFL-treated fabric exhibits superior performance, making it ideal for industrial aprons. The study concludes that the combination of advanced materials and chemical treatments offers a durable and safe solution for industrial protective garments, addressing the need for high-performance textiles in demanding environments.

## CONCLUSIONS:

This research demonstrates the potential of advanced textile materials and chemical treatments to create high-performance industrial aprons that ensure safety and durability for workers in demanding environments. By combining polyester-cotton melange fabric with nylon 6,6 and applying a Resorcinol Formaldehyde Latex (RFL) coating, the resulting fabric exhibits superior mechanical properties, including enhanced tensile strength, tear resistance, dimensional stability, and abrasion resistance. These qualities make the fabric ideal for industrial applications where protection against harsh conditions is essential.

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