SUSTAINABLE INNOVATION

Therpol and The 5th Industrial Revolution

Therpol

www.therpolinnovation.com.br

Who we are...

We were born on the great opportunity to reduce the rubber production costs by injecting the rubber in the same process of the plastics

More than 40 years experience in the Rubber and Plastic Industries and we have a dream to make the things in a different way

We developed The Revolutionary Technology THERPOL+ based on three pillars:

a) Improving our ecosystem protection
b) Promoting the Circular Economy and
c) Getting savings for the worldwide markets

Therpol T+

WHAT IS THE THERPOL + TECHNOLOGY?

SUSTAINABLE INNOVATION

Natural Rubber Thermoplastic from **Renewable-Bio Source** raw material

LINK TO INCREMENTAL INNOVATION AND DISRUPTIVE

Improves the products properties and creates new products application thru + rubber appearance, + flexibility, + productivity, + Environmental Protection

T+

Improves Products and Trademarks Profits

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WORLDWIDE INNOVATION

PATENT REQUIRED IN USA, COLOMBIA AND BRAZIL

“ The possibility to manufacture rubber as similar as the plastic injection process, using natural rubber or any other rubber as raw material”

+

Plastic modified by using the **Natural Rubber**

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POTENTIAL MARKETS

Rubber

Shoes: Flip Flop Straps / Soles / Boots / Foamed Filp Flop Soles

Autoparts / Motoparts / Truckparts

Water pipeline Gaskets

Agro Rubber Goods

Mats

General Purpose Rubber Goods

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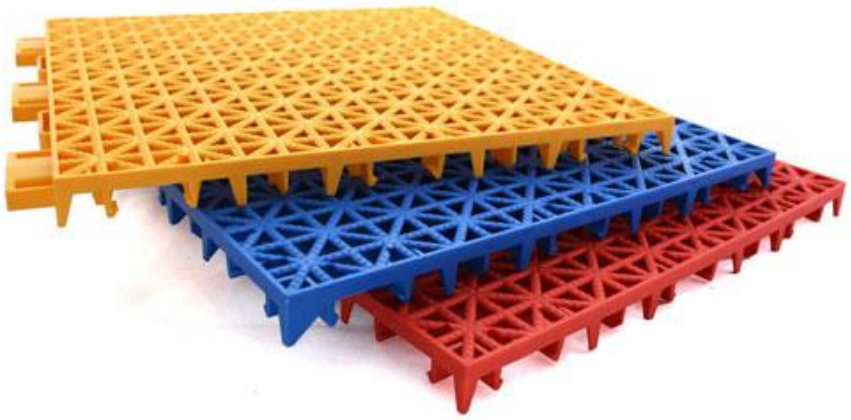

POTENTIAL MARKETS

Plastics (Virgen and Recycled Resins)

PP: Beverage boxes and others, Tables, Chairs, Pallets, Agro, Toys, Packaging, Filters, Mats, Flip Packaging Cover, ...

PE: Fish boxes and others, Pallets, Health Care Toilet, Helmet, Toys, Pipes and Conectors, GP PE application

PS: Trays, Hangers, Seals, Combs, Electrical Breakers, ...

ABS: Toys, Autoparts, Furniture, Panels, Cellular, Appliances

PET: Packs, Covers and PCR

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MARKETING STRATEGY

- **FOOTWEAR: OUTSOLES AND SANDALS STRAPS**

- OUTSOLES: Good Abrasion (150mm³), Rubber Finishing, Good Flexibility (>100,000 cycles), Good Grip
    - New Thermoplastic based on Bio Raw Material (Natural Rubber)
    - 100% Recyclable
    - Therpol is not Rubber, PVC, TPR, TPU,... Therpol is Therpol

- SANDALS STRAPS: Low Density, High Tensile Strenght and Elongation
    - Replaces TPU and TPR
    - 100% Recyclable

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THERPOL FOR FOOTWEAR OUTSOLES

	STANDARD TPR	THERPOL NRAD/35
Hardness Shore A (Pts)	70	70
Density (g/cm³)	1,00~1,05	1,04
Abrasion (mm³)	250	180
Flexion (Cycles)	30,000	>100,000

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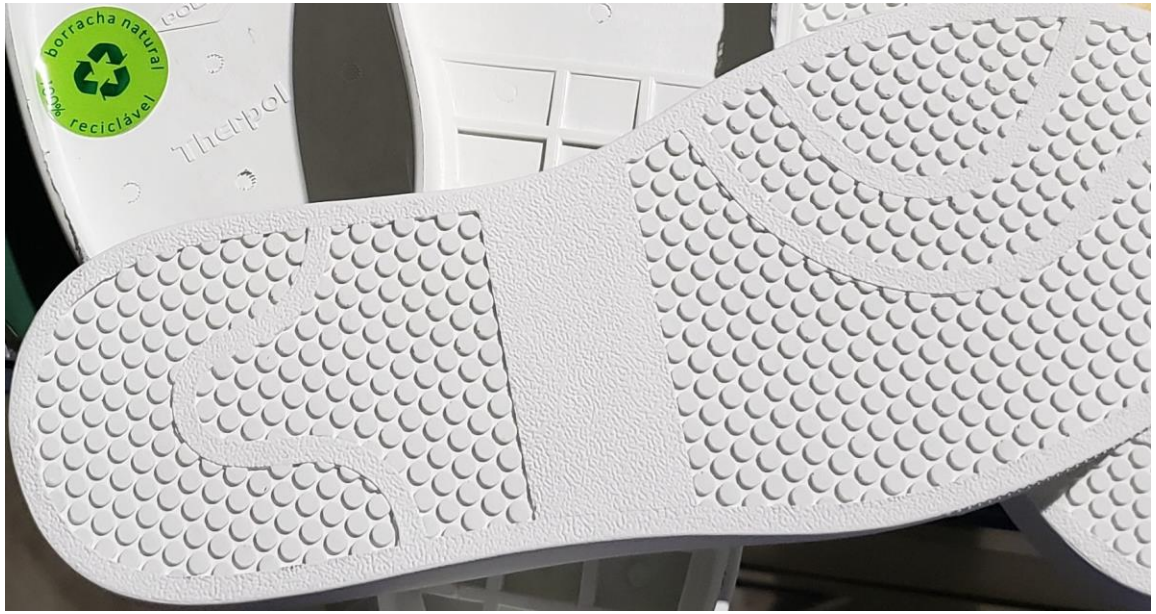
Therpol Footwear Outsoles
100% RECYCLABLE



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100% FOOTWEAR RECYCLABILITY INCLUDING FABRICS, RUBBER OUTSOLE AND EVA BY USING THERPOL

PVC FREE STRAPS

30% LIGHTHER THAN TPU

MARKETING STRATEGY

- **AUTOPARTS:**
  - High Hardness 80 Shore A to 50 Shore D
  - 100% Recyclable
  - Flexibility and Dynamic Properties
  - Weather Resistant
  - Replaces TPR, TPU and Cured Rubber

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MARKETING STRATEGY

- **PLASTICS: PP, PE, PET, ABS, PS…**
  - Innovation – Natural Rubber as Plastic Modifier
  - High Impact Resistant
  - High Elongation
  - High Flexibility
  - Enhance Rubber Properties into the Plastics (Grip)
  - Improves the Plastics Low Temperature Resistant
  - PP + Therpol replaces PA66 (<130℃ working temperature)
  - Improves Recycled Plastics Properties
  - Improves the Transition Resin Plastics Grades (off specs) into Prime Grades

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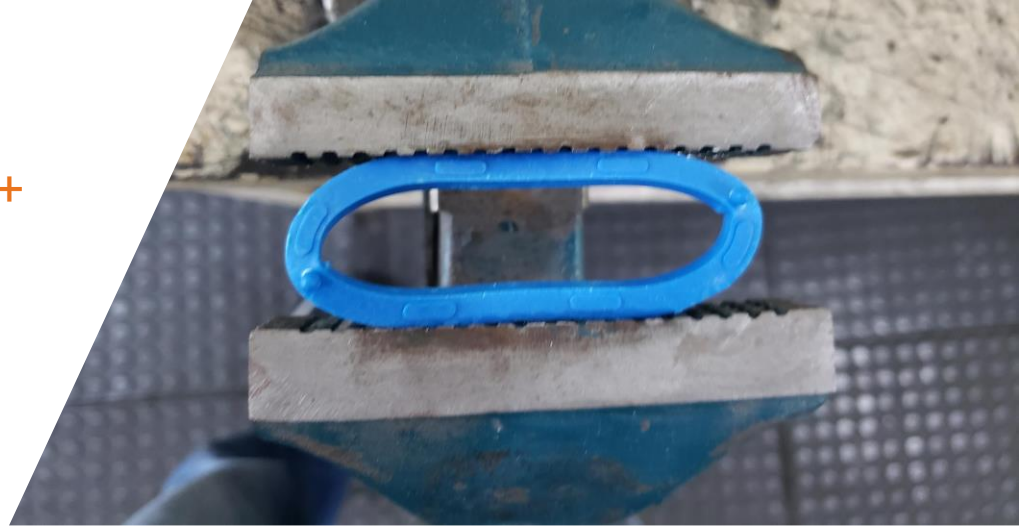
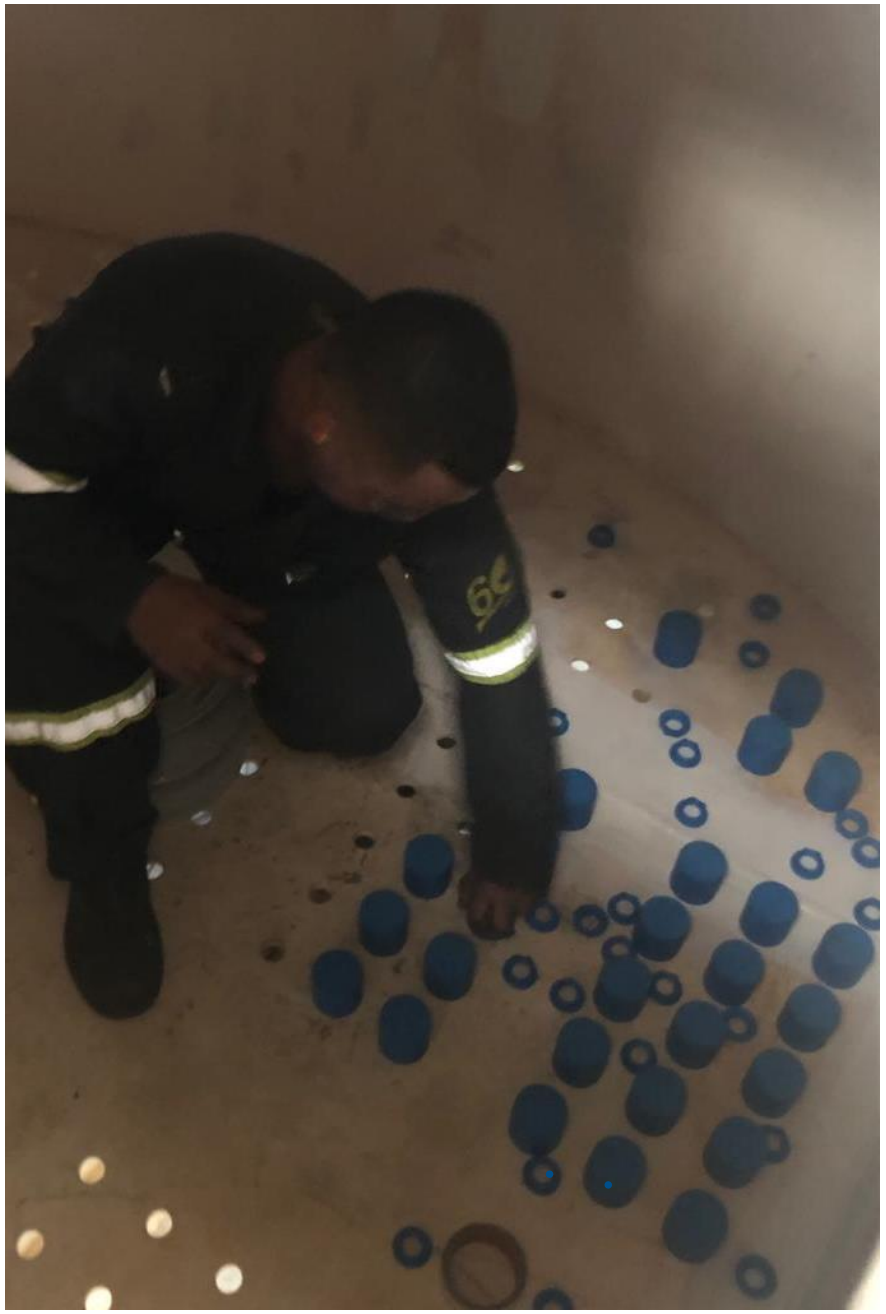


CASE THERPOL IN CREPINAS (FILTERS) CLOSED LOOP

THERPOL ENHANCE HIGH FLEXIBILITY TO THE RECYCLED POLYPROPYLENE



CASE CLOSED LOOP POLYPROPYLENE

THERPOL ENHANCE HIGH FLEXIBILITY TO THE RECYCLED POLYPROPYLENE

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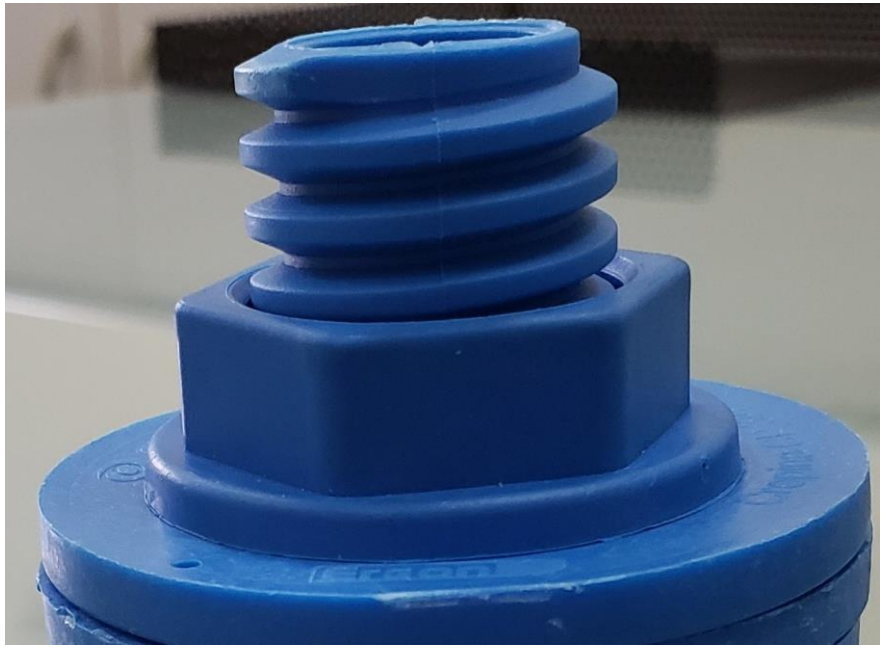

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CASE THERPOL IN CREPINAS (FILTERS) CLOSED LOOP

RECYCLED POLYPROPYLENE (FISH BOXES)

	Standard	Therpol 5%	Therpol 10%	Therpol 15%
Hardness Shore D pts	60	60	55	52
Tensile Strengh kgf/cm²	390	365	350	325
Elongation %	50	100	125	135

THERPOL PERFORMANCE IN RECYCLED PET (FLAKES)

	Weight on Machine = 18,54N	(PE) Potential Energy = 13,896J	
ROOM TEMPERATURE	**STANDARD**	**THERPOL 3%**	**THERPOL 5%**
kJ/m²	127,5	171,4	190,6
LOW TEMPERATURE TEST -20°C			
kJ/m²	51,2	71,8	85,1

NATURAL RUBBER IMPROVES THE LOW TEMPERATURE RESISTANCE

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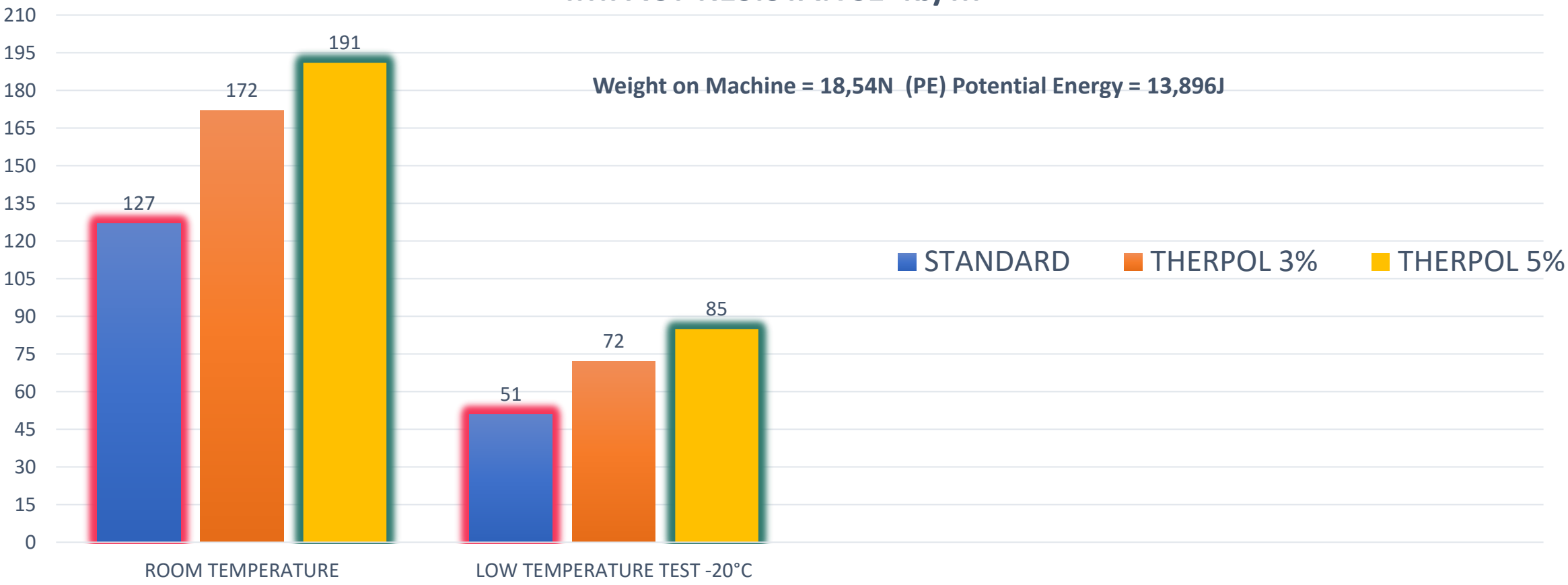
IMPACT RESISTANCE kJ/m²



CASE: SCRAPERS DEVICE FOR SUGAR MILLS

POLYPROPYLENE + THERPOL REPLACES POLYAMIDE 66 (NYLON66) FOR <130°C USAGE

THERPOL ENHANCE HIGH GRIP AND ABRASION RESISTANT TO POLYPROPYLENE

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THERPOL IMPROVES (GRIP) AND REPLACES TPE IN MANY APPLICATIONS

CASE MOTORCYCLE ABS BODY PARTS

RECYCLED ABS + 5% THERPOL

THERPOL IMPROVES FLEXIBILITY TO THE RECYCLED ABS

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RELATÓRIO DE ENSAIO
ANÁLISE QUÍMICA

INTERESSADO: **PROQUITEC INDUSTRIA DE PRODUTOS QUIMICOS S/A.**
R IFEMA, 291 – CENTRO
CEP: 06730000 – VARGEM GRANDE PAULISTA (SP)
E-mail: norbetocamargo@proquitec.com.br
Ref.: (148226)

1. IDENTIFICAÇÃO DAS AMOSTRAS

01 (Uma) amostra de corpo de prova, identificada pelo interessado como: 250000B2 THERPOL OG70, Lote: 16520002, e recebida pelo laboratório em 19/03/2020.
Identificação Interna: L-0298157.

2. MÉTODO / ESPECIFICAÇÕES

Resolução Diretoria Colegiada nº 52, de 26 de Novembro de 2010 – Agência Nacional de Vigilância Sanitária – ANVISA

3. RESULTADOS OBTIDOS

3.1. Metais e metaloides em corantes

PARÂMETROS	UNIDADE	RESULTADOS	ESPECIFICAÇÃO	LIMITES DE QUANTIFICAÇÃO
Antimônio (Sb)	%	<0,00075	Máx. 0,050	0,00075
Arsênio (As)	%	<0,00075	Máx. 0,005	0,00075
Bário (Ba)	%	<0,00075	Máx. 0,010	0,00075
Cádmio (Cd)	%	<0,00075	Máx. 0,010	0,00075
Chumbo (Pb)	%	<0,00075	Máx. 0,010	0,00075
Cromo (Cr)	%	<0,00075	Máx. 0,100	0,00075
Mercúrio (Hg)	%	<0,00075	Máx. 0,005	0,00075
Selênio (Se)	%	<0,00075	Máx. 0,010	0,00075
Zinco (Zn)	%	<0,00075	Máx. 0,200	0,00075

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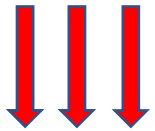
- CIRCULAR ECONOMY MODEL



less ENERGY less WASTE less POLUTION

more JOBS more **BIO**RAW MATERIAL more WORTH

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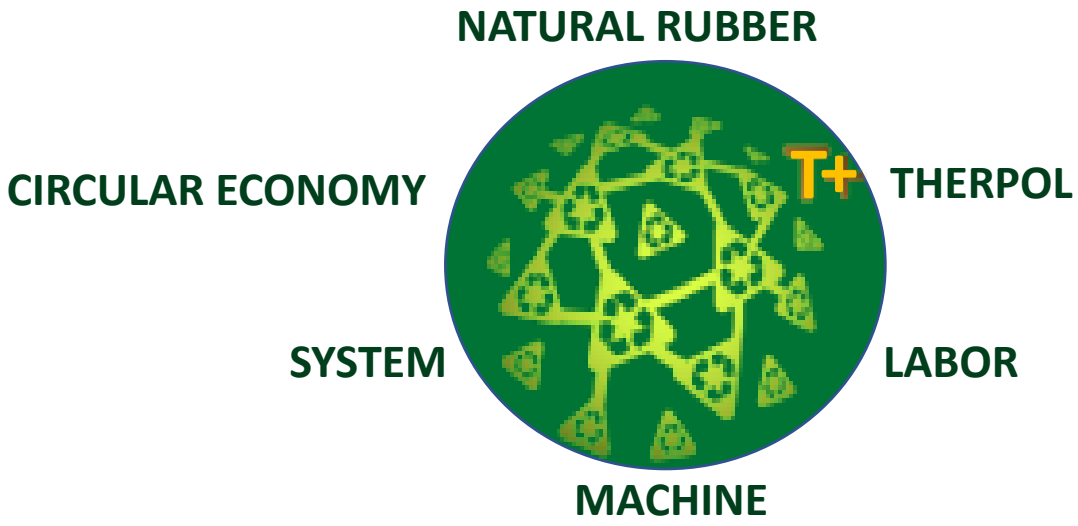
SUSTAINABLE INNOVATION

WE OFFER T+

- 5th INDUSTRIAL REVOLUTION: LABOR – MACHINE – SYSTEM (IT)
- THERPOL ATTENDS THE INDUSTRIAL REVOLUTION + SUSTAINABILITY BY CIRCULAR ECONOMY



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SUSTAINABLE INNOVATION

THERPOL+ BIOINNOVATION

THE 5TH INDUSTRIAL REVOLUTION HAS JUST STARTED

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vendas@proquitec.com.br