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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

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..., USSR, 21 - 31 October 1969

PET.SYMP. D/5

LOW COST FLOOR-COVERINGS FROM POLYPROPYLENE FILMS[1/]

by

C. Caldo
Polymer SpA.
Milan
Italy

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... mon 1953, ... left ... of fact. ... and has ... am, ... sphere has ... long ... in the ... This comparatively ... in ... to ... in ... and in the ... industry, ... with ... particular with ... of the textile ... output ...

... application ... for polypropylene fibre: ... ... amounted to abt. ... and abt. ... were ... that some 70 million ... square metres of floor ... made with polypropylene fibre were produced ..., and it ... that ... represented more than ... of the total carpet production in ... and Europe. In other words, one ... out of seven ... polypropylene fibre.

... only six or seven years on the market, this is a ... good result for polypropylene fibre, which is used in the form of ... and textured continuous filament, and is transformed in woven rugs, ... and needlepunched carpets. It should be ... to emphasize the fact that ... carpet sector of the ... industry has ... been an easy one to be ... Once there was ..., and not ... that wool; then ... man-... fibres and practically ... with ... joined the ... position by ... ... and efforts; ... to maintain ... more ... to maintain carpets.

... this market is ... by polyamide fibres, with acrylics ..., second and polypro... fibre and wool ... closely. Polyesters are ... to show no ... whatever, ... generally loosing ground.

... brief discussion ... the ... serves the purpose of illustrating ... and competition ... fibre ... It may not be ... its ... is ... ... polypropylene ... one the figures show its ... ... success.

... thus made ... brief ... of ... fibre in the ... not clear, we will now ... our ... to a particular ... of this industry, which is of ... and ... use: the needle punched ... coverings.

... type of floor ..., is ... since 25 or even 30 years, but ... is ... enjoying a sort of second youth, whose blooming can be ascribed

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Kazan, USSR, 20 - 31 October 1969

PI.SYMP. /6

SUMMARY

LOW COST FLOOR-COVERINGS FROM POLYPROPYLENE FIBRES 1/

by

V. Norici

Polymer Spa
Milan - Italy

Polypropylene has won today a worldwide acceptance in the field of plastics and packaging, as well as in the textile industry. Use of polypropylene fibre in the production of floor-coverings is illustrated. Consumption data show the size of this market for different countries, and also the significant penetration achieved by this comparatively new fibre in such a competitive sector.

In particular, needle-punched carpets are reviewed, both from a manufacturing stand point and with regard to the properties of fabricated articles. The economics of this process for carpet production are briefly illustrated. Future developments are anticipated.

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[illegible]
Page 2

The properties of fibres based on polypropylene fibres are then discussed making special reference to those characteristics that are particularly meaningful for their influence on the final product:

lightness
[illegible] resistance
chemical resistance
dimensional stability
dyeability

Some actual applications of Meraklon N in this field are illustrated in detail (samples will be available at the Symposium).

exclusive [illegible] properties of polypropylene and polyamide fibres, as we will [illegible] carpet production is divided into different [illegible] briefly revise here under.

The [illegible] the staple fibre, and consists in blending fibres [illegible] in colour, chemical nature, fineness or other [illegible] practice to do so both for economic and technical reasons.

- blending of [illegible] coloured fibres is often necessary to improve both aesthetic [illegible] tones of the carpet surface
- sometimes a [illegible] fibre is "diluted" with a cheaper staple to bring down [illegible] predetermined level
- by using fibres [illegible] dyeing special effects can be obtained on the carpet surface.

Blending is [illegible] on normal wolf-cards.

After fibres [illegible] go through the web-forming machines, usually high production [illegible] but not identical to those used in wool spinning. The [illegible] is thus transformed in a card web that in turn is made into [illegible] layers, so to reach a certain weight per unit surface.

This same [illegible] be done by other machines that form the fibre web through use [illegible] air flow, thereby eliminating the card. Such machines are [illegible] Rando, Kohlloeffel, or Ingleiter.

The web, [illegible] by the card-lapper unit or by these machines, is then coupled [illegible] and fabric whose purpose is to increase the mechanical resistance [illegible] final article. Sometimes this is not necessary and therefore the [illegible] goes directly to the needle-punching loom.

This machine [illegible] what makes the hob, in the sense that it changes a loose fibre [illegible] something that could already be defined as a floorcovering. [illegible] loom is essentially made up with

- a support table [illegible] which the fibre web is passed
- a wooden or [illegible] bar from which hundreds of barbed needles are sticking out towards [illegible] fibre web; this bar has a reciprocating motion off/towards the [illegible] table and in doing so it pierces the fibre web

... for the needle punched web or a feeding system for the following ...

... carbon needles ... that they bring fibres ... only ... fibre web is thoroughly ... after passing ... loom.

... this essential ... operation. It is done either by ... the carpet with ... and curing it or by coating ... of the carpet ... materials. The carpet ... finished and ready ... very important operation can be ... to the process: tile cutting.

... machines ... off ... carpet roll squares tiles 25 x 25 cm ... 40 x 40 cm that are sold in boxes, each containing twelve or twenty tiles. ... cases, before tile cutting the ... is back-coated with an adhesive ... that the tiles can be glued to the floor by the end-user himself. If we ... examine the process we have just finished describing, one simple but ... consideration comes to our mind: in one single process, that can ... carried out with no interruption, the simple fabric is transformed into a ... covering. And this is why we ... these carpets "low cost floor ...".

... think it is useful to give a rough and approximate idea of the ... costs required for such a plant ... referred to machines ... by firms of world-known importance, specially studied for this kind ... production, in a width of 3 mt.

	Millions lire	Millions lire
a. blending		6.0
b. wet forming		
- feeders	20.0	
- cards	30.0	
- lappers	10.0	60.0
c. needlepunching		
- 3 needle-looms	36.0	
- edge cutters and accessories	3.5	39.5
d. finishing (boiler not included)		55.0
e. tile cutting		9.0
	Total investment	169.5

Such a plant has a capacity of abt. 1,500 sqm of finished product for an eight hours shift and requires 5 men/shift plus supervision and warehousing.

We have seen that the production of needle-punched polypropylene carpets is a simple and economic process. Let us go a step ahead to see why and how such a carpet should be made (and in most cases is made) with polypropylene staple fibre.

The characteristics of major importance for a fibre to be transformed into a carpet - those which in a certain sense form the basis for the attainment of commercial success - are:

1. resistance to wear and tear
2. resistance to soil and to staining
3. colour fastness

Such characteristics are in fact necessary for the best use of the carpet expected and demanded by its purchaser.

Secondly, appraisement could be made of other characteristics, which to our mind are of a certain importance, namely:

Polypropylene and polyamid... relatively high loads encounter... fibre and wool yield complete...

And since resistance to ... punched ... coverings, we f... and polyamide fibres are inde...

2. Soil and stain resistance

One of the reasons why ... markets lies in the common opini... stain easily and lose their appe... looked after.

Much of this sort of thinki... public mind by the ever-increasi... offer high resistance to dir..., mil..., every novelty in this field, every step ahead ... carpet, is eagerly welcomed by ... worried about the bother carpet mainten...

From this particular point ... of security and absolute assuran... that its chemical nature endows upon it.

This will result clearly f...

Stain just like any other ty... liable to be stained by liquids that fal... however, it may happen that the ... these liquids, in which case the ... With Heraklon this does not occu... and not as a result of special treatm... or conversion into carpets.

Polypropylene fibre, in fact, ... can be seen from fig. 3 which shows the ... for different fibres.

This means that the staining ... of the fibre and can thus be removed by simple ... water rinse, with no

...ear that traces will be left on the carpet.

In addition, ... polypropylene ... further defense ... polypropylene ... affinity of polypropylene ... the carpet, and also ... solvents.

Dust: carpets, obviously, are subject to receiving the dust caused by normal service, and therefore require ... floor covering. Here, ... attached without ... and moreover they dry very quickly because the ... fibre.

4. Colour fastness

Granted that carpets ... commodity, they are obviously expected ... too rapid deterioration of quality.

In particular, the ... perhaps one of the most ... unaltered for a long time. ... more attractive than one ... more or less intense.

Great attention is ... dyers to the problem of ... important with respect to ... plays a leading part in ...

Polypropylene fibre ... other fibres, and must therefore be dyed by ... polymer prior to extrusion of the fibre.

[illegible] polypropylene fibre producers [illegible] wide range of colours [illegible] other it has assured [illegible] polypropylene fibre. The [illegible] novel as a result of [illegible] technique allows the use [illegible].

[illegible] studying and development [illegible] for carpets, which has recently been placed onto the market.

In fact, this new type was also required to offer converters and consumers the same assortment of colour [illegible] when they were accustomed with spun-dyed [illegible]; through a study of dyeing methods and a selection of the most suitable [illegible] we have thus produced a very wide series of recipes having colour fastness practically equal to the excellent spun-dyed series.

[illegible] we have summarized the "must" properties required of [illegible] and think it may be considered that Meraklon polypropylene fibre [illegible] to be considered an excellent material for this purpose.

We shall now examine one peculiarity of Meraklon that has not been mentioned before and that it is very significant for the success of a floor covering only if more exactly we refer to "dimensional stability". As we have seen, a needle punched floor covering is a non-anisotropic isotropic structure composed of randomly distributed, entangled, fibres. It may, or may not, comprehend a [illegible]. Such a structure is capable to expand and shrink in accordance with temperature and humidity of the surrounding atmosphere. It must be pointed out, though, that relative humidity can vary in a home within a range far wider than that of temperature variations and it is therefore relative humidity that controls the [illegible].

The peculiar chemical nature of [illegible] gives to needle punched carpets made with this fibre a very high dimensional stability. Since polypropylene fibres are unaffected by moisture, they will not swell when relative humidity rises and will not shrink when it goes down. The needle punched structure will thus keep its original dimensions no matter how dry or damp

- [illegible] polypropylene [illegible]
- [illegible]
- [illegible]

[illegible] low cost of the [illegible] pushed carpet [illegible] made at the [illegible]

[illegible] to produce commercially "low cost fib[illegible] from polypropylene [illegible]

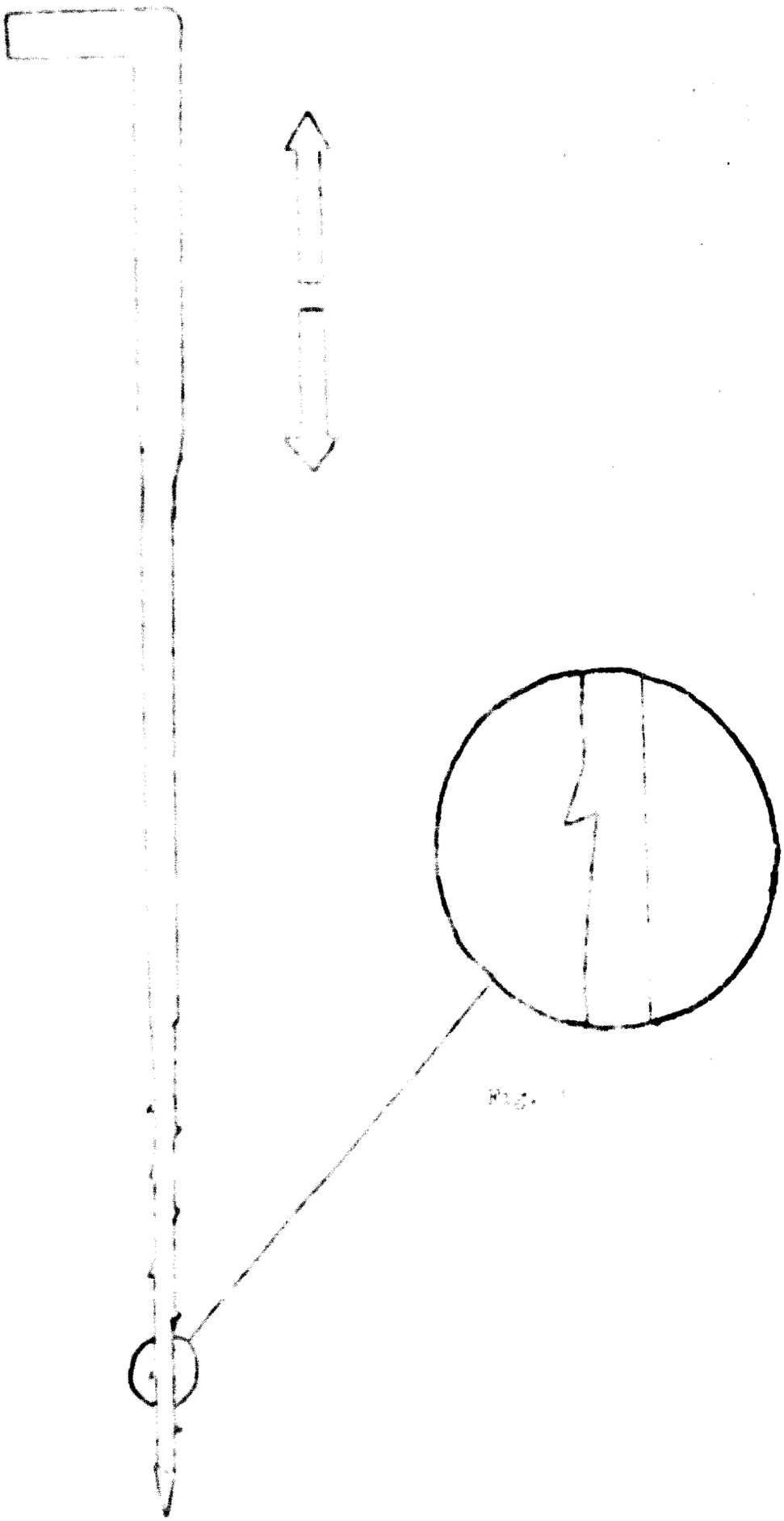


Fig. 1

Abrasion Resistance of Single Filaments

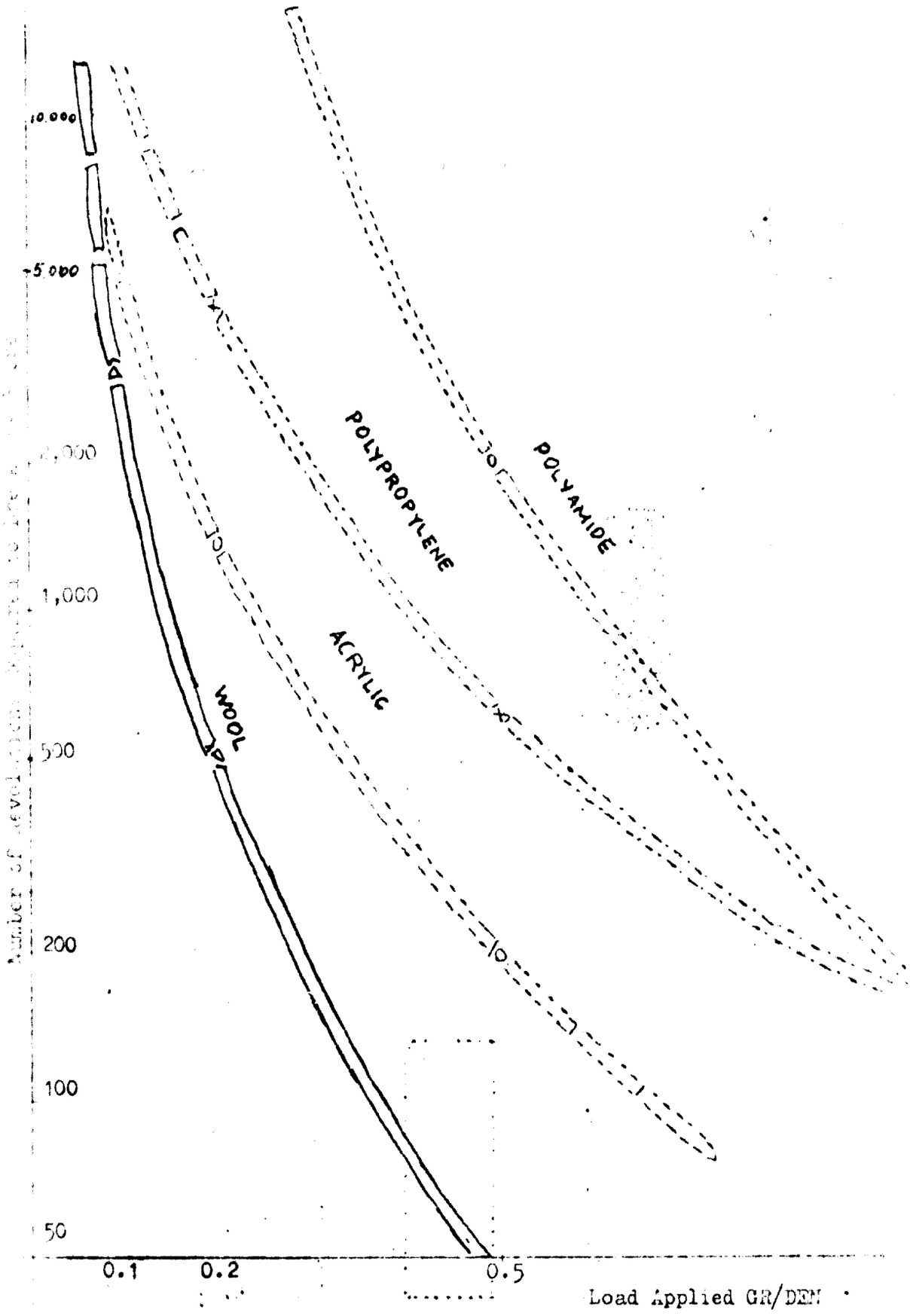
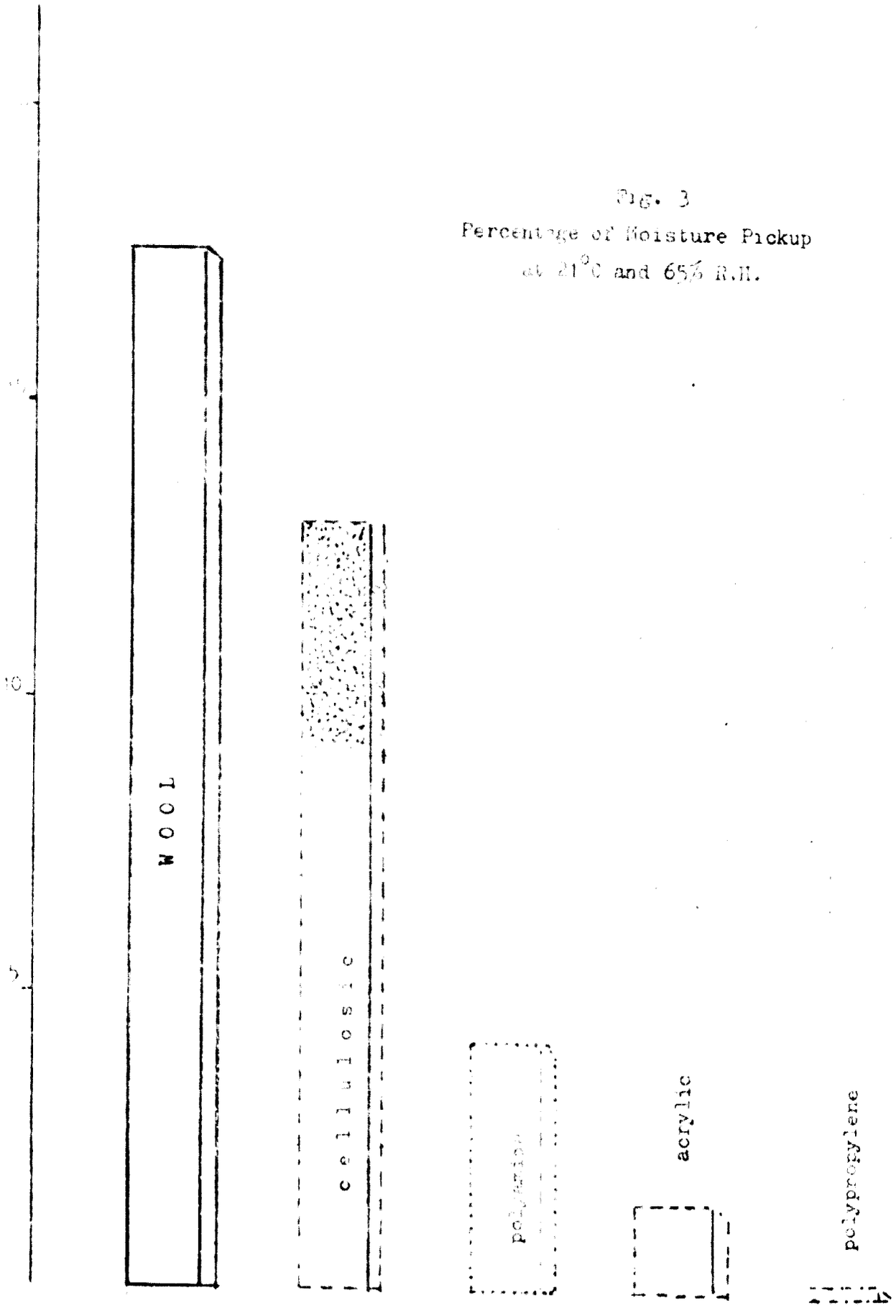
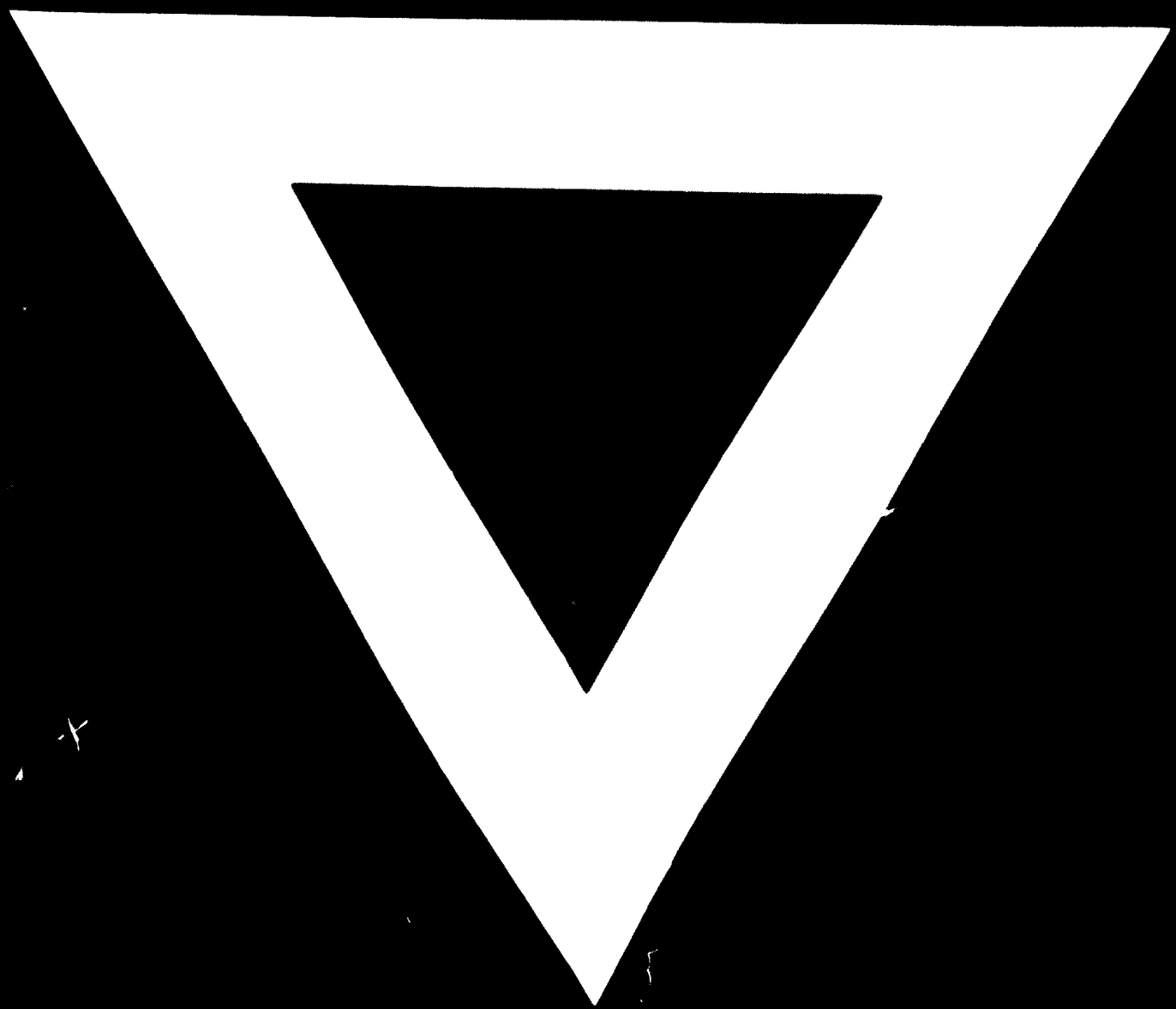


Fig. 3
Percentage of Moisture Pickup
at 21°C and 65% R.H.





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