Chapter 54

Man-made filaments; strip and the like of man-made textile materials

Notes.

1.- Throughout the Nomenclature, the term " man-made fibres " means staple fibres and filaments of organic polymers produced by manufacturing processes, either :

(a) By polymerisation of organic monomers to produce polymers such as polyamides, polyesters, polyolefins or polyurethanes, or by chemical modification of polymers produced by this process (for example, poly(vinyl alcohol) prepared by the hydrolysis of poly(vinyl acetate)); or

(b) By dissolution or chemical treatment of natural organic polymers (for example, cellulose) to produce polymers such as cuprammonium rayon (cupro) or viscose rayon, or by chemical modification of natural organic polymers (for example, cellulose, casein and other proteins, or alginic acid), to produce polymers such as cellulose acetate or alginates.

The terms "synthetic" and "artificial", used in relation to fibres, mean : synthetic : fibres as defined at (a); artificial : fibres as defined at (b). Strip and the like of heading 54.04 or 54.05 are not considered to be man-made fibres.

The terms " man-made ", " synthetic " and " artificial " shall have the same meanings when used in relation to " textile materials ".

2.- Headings 54.02 and 54.03 do not apply to synthetic or artificial filament tow of Chapter 55.

GENERAL

The General Explanatory Note to Section XI should be taken into account in reading the Explanatory Note to this Chapter.

Under Note 1 to Chapter 54, the term " man-made fibres ", when used in Chapters 54 and 55 or elsewhere in the Nomenclature, means filaments or staple fibres composed of organic polymers produced by manufacturing processes, either by :

(1) Polymerisation of organic monomers or chemical modification of the resulting polymers (see the General Explanatory Note to Chapter 39) (synthetic fibres); or by

(2) Dissolution or chemical treatment of natural organic polymers, or chemical modification of natural organic polymers (artificial fibres).

(I) SYNTHETIC FIBRES

The basic materials for the manufacture of these fibres are generally derived from coal or oil distillation products or from natural gas. The substances produced by polymerisation are either melted or dissolved in a suitable solvent and then extruded through spinnerets (jets) into air or into a suitable coagulating bath where they solidify on cooling or evaporation of the solvent, or they may be precipitated from their solution in the form of filaments.

At this stage their properties are normally inadequate for direct use in subsequent textile processes, and they must then undergo a drawing process which orientates the molecules in the direction of the filament, thus considerably improving certain technical characteristics (e.g., strength).

The main **synthetic fibres** are :

(1) **Acrylic** : Fibres composed of linear macromolecules having in the macromolecular composition at least 85 % by weight of the acrylonitrilic unit.

(2) **Modacrylic** : Fibres composed of linear macromolecules having in the macromolecular composition at least 35 % but less than 85 % by weight of the acrylonitrilic unit.

(3) **Polypropylene** : Fibres composed of acyclic saturated hydrocarbon linear macromolecules having in the macromolecular composition at least 85 % by weight of units with every other carbon atom carrying a methyl side group in an isotactic position and without further substitution.

(4) **Nylon or other polyamides** : Fibres composed of synthetic linear macromolecules having in the macromolecular composition either at least 85 % of recurring amide linkages joined to acyclic or cyclic groups or at least 85 % of aromatic groups joined by amide linkages directly to two aromatic rings and in which imide groups may be substituted for up to 50 % of the amide groups.

The term " nylon or other polyamides " includes **aramids** (see Note 12 to the Section).

(5) **Polyester** : Fibres composed of linear macromolecules having in the macromolecular composition at least 85 % by weight of an ester of a diol and terephthalic acid.

(6) **Polyethylene** : Fibres composed of linear macromolecules having in the macromolecular composition at least 85 % by weight of the ethylene unit.

(7) **Polyurethane** : Fibres resulting from the polymerisation of polyfunctional isocyanates with polyhydroxy compounds, such as, castor oil, butane-1,4-diol, polyether polyols, polyester polyols.

Other synthetic fibres include : chlorofibre, fluorofibre, polycarbamide, trivinyl and vinylal.

Where the constituent matter of the fibres is a copolymer or a mixture of homopolymers as understood for Chapter 39, e.g., a copolymer of ethylene and propylene, for the classification of the fibres, the respective percentages of each of the constituents must be taken into consideration. With the exception of polyamides these percentages refer to weight.

(II) **ARTIFICIAL FIBRES**

The basic materials for the manufacture of these fibres are organic polymers extracted from natural raw materials by processes which may involve dissolution or chemical treatment, or chemical modification.

The main **artificial fibres** are :

(A) **Cellulosic fibres**, namely :

(1) **Viscose rayon**, which is produced by treating cellulose (generally in the form of sulphite wood pulp) with sodium hydroxide; the resulting alkali-cellulose is then treated with carbon disulphide and transformed into sodium cellulose xanthate. The latter is in turn transformed into a thick solution known as viscose by dissolving it in dilute sodium hydroxide.

After purification and maturing, the viscose is then extruded through spinnerets into a coagulating acid bath to form filaments of regenerated cellulose. **Viscose rayon** also covers modal fibres, which are produced from regenerated cellulose by a modified viscose process.

(2) **Cuprammonium rayon (cupro)**, obtained by dissolving cellulose (generally in the form of linters or chemical wood pulp) in a cuprammonium solution; the resulting viscous solution is extruded into a bath where filaments of precipitated cellulose are formed.

(3) **Cellulose acetate (including tri-acetate)** : Fibres obtained from cellulose acetate wherein at least 74 % of the hydroxyl groups are acetylated. These are manufactured by treating cellulose (in the form of cotton linters or chemical wood pulp) with a mixture of acetic anhydride, acetic acid and sulphuric acid. The resulting primary cellulose acetate is modified to a soluble form and dissolved in a volatile solvent such as acetone, then extruded (generally into warm air); the solvent then evaporates leaving filaments of cellulose acetate.

(B) **Protein fibres** of animal or vegetable origin, including :

(1) Those produced by dissolving milk casein in an alkali (generally sodium hydroxide); after maturing, the solution is extruded into an acid coagulating bath. The resulting filaments are subsequently hardened by treatment with formaldehyde, tannin, chromium salts or other chemical compounds.

(2) Other fibres produced in similar manner from the proteins of ground-nuts, soya beans, maize (zein), etc.

(C) **Alginate fibres**. Chemical treatment of various types of seaweed gives a viscous solution, generally of sodium alginate; this is extruded into a bath which converts it into certain metallic alginates. These include :

(1) Calcium chromium alginate fibres; these are non-inflammable.

(2) Calcium alginate fibres. These are readily soluble in a weak alkaline solution of soap; this makes them unsuitable for ordinary textile use, and they are most often used as temporary threads in certain manufacturing operations.

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54

The Chapter covers man-made filaments and yarns and woven fabrics of such filaments, including yarns and woven fabrics of mixed textile fibres classified by application of Note 2 to Section XI as yarns and woven fabrics of man-made filaments. It also covers monofilament and other products of heading 54.04 or 54.05 and woven fabrics of such products.

Filament tow, **other than** that defined in Note 1 to Chapter 55, is included. This is generally used for the manufacture of cigarette filters, whereas filament tow of Chapter 55 is used for the manufacture of staple fibres.

This Chapter **excludes** :

(a) Yarn used to clean between the teeth (dental floss), in individual retail packages, of **heading 33.06**.

(b) Products of **Chapter 40**, in particular thread and cord of **heading 40.07**.

(c) Products of **Chapter 55**, in particular staple fibres, yarns and woven fabrics of staple fibres and waste (including noils, yarn waste and garnetted stock) of man-made filaments.

(d) Carbon fibres and articles of carbon fibres, of **heading 68.15**.

(e) Glass fibres and articles of glass fibres, of **heading 70.19**.