WEEK 16

Miscellaneous Construction materials

① Asbestos:-

Asbestos is heat resistant silicate mineral

The work asbestos is derived from Geek word which means inextinguishable (which cannot be destroyed)

→ It is naturally occuring usually exist in between layers of specific rocks.

Types Two types

1. Friable Asbestos:-

The asbestos that is made from the matrial that can be easily crush pulverized and converted into powder by human hand.

Examples:-

Blue asbestos & Brown asbestos

2 Less friable:-

The asbestos that is not easily break and converted into powder

→ these asbestos have curled fibres.

Example:- White asbestos.

Properties of Asbestos:-

- Asbestos are chemically inert, insoluble in water & organic solvents
- They are [illegible] of [illegible]
- It can absorb sound
- If its powder is inhaled for long time it causes lung cancer
- It is hard (resist to abrasion)
- It is flexible and malleable, can be divided into fine fibres
- It has more tensile strength i.e. more than steel
- It has good thermal stability, electrical resistance & non-flammable
- It protects against corrosion

Uses of Asbestos:-

- It is widely used in construction.
- It is used in friction products like brake lining, clutch assemblies etc.
- It is used for thermal insulation, electric insulation, acoustic insulation and fire proofing
- Asbestos is used as asbestos cloth in fire proofing.

Scanned with CamScanner

2. Plaster of Paris:-

"It is fine white powder of sulpate hemihydrate that hardens when moist will with and allow to dry."

(i) It is mostly manufacture near place of Paris i.e why known as plaster of Paris.

(ii) Properties:-

- Easily mixed with water.
- Highly fire & heat resistant.
- Give decorative interior finishing.
- It is easily spread & level.
- It does not cause surface to crack.

Uses:- It is used for coating of walls and cieling also to make architecture designs on cieling.

(3) Abrassive:-

Usually hard substance that is used for grinding, shaping & polishing of other substances.

- Examples:-

Types

Natural abrasive

Non silicon Abrasive
eg Diamond
Corundum

Quartz
eg Garnet

Synthetic Abrasives
They are human made that are composed of aluminum oxide, Silicon carbide, boron Carbide etc.
- Aluminum oxide is mostly used.
- About 40% of grinding wheels consist of abrasives

Coated Abrasive
It is fixed to the backing material such as cloth, paper, resin rubber etc.
Common example is sand paper

Bonded Abrasive
- It is attached to matrix. Matrix is called binder i.e often Clay, rubber, resin or glass

Properties of Abrasives

- Usually hard
- Not get heat by friction
- Ability to scratch away or sharp edges with
- Chemically inert
- High melting point

4. Rubber:-

It is high polymer that deform under load and regain its original size & shape after removal of that load.

→ It is also known as elastomer.

Types

Natural Rubber
The rubber that is obtain from latex of different plants.
Eg: The commercial source of natural rubber is tree Heve Brasilien.

Synthetic Rubber.
→ The rubber that is synthesized in factories.
→ These rubbers are mostly synthesized from by product of petrolium.

Properties:-
- They are hard & chemical inert.
- Insoluble in water.
- Can regain its shape.
- Poor conductor of heat & electricity.
- Flexible & non transparent.

Uses:-
- Used in various construction products.
- In expansion joints.
- In windows
- In pipes & as sound insulation.
- Railway tie pad application.
- Used in bridge construction.

(5) Cork :-

Cork is bark of cork tree that is harvested after 9-12 years.

→ It is outer covering of tree that is stripped without harming tree

→ Such trees are found in France, Italy, Central asia, China etc.

Properties :-

- It can absorb vibration.
- It has light weight & low density.
- It is fire resistant & durable
- Cork is plable & rebound well to its original size & shape
- Cork is permeable to both liquids & gases. Gives good sealing capability.

Uses :-

- It is used as decorative for cieling, roof & floor.
- Used to absorb vibration in buildings
- Used in contraction & expansion joint.
- Cork sheet is also used for making kitchen cabinet & cupboard.

⑥ Bitumen:-

It is not crystalline & non viscous material derived from petrolium either by natural or refinary process.

- Brown or black in colour.
- It contains 85% Carbon, 12% hydrogen & 3% oxygen.
- In solid state it is called asphalt & In semi liquid state called Tar.

Forms of Bitumen:-

ⓐ Bitumen Emulsion:-

When bitumen is added to excess of water, bitumen emulsion form.

- It is a mixture of bitumen & water.
- They are available in different form ⓐ Rapid setting, medium setting & slow setting.
- These emulsion are always stored in tight drum

ⓑ Uses:-

Used in construction of bitumenous road & for maintainence & repair work.

(b) Blown Bitumen:-

It is obtain by passing air at Pressure at high temperature

- It is industrial bitumen, form by oxidation
usually black in colour.
- Available in packets.

Uses:-
- It can be used as;
→ As heat insulator
→ As damp proof & roof.
→ In manufacture of pipe

(c) Cut back Bitumen:-

This bitumen is cut back by adding controlled amount of petrolium distillate such as Kerosine.
- This is done to reduce viscosity of bitumen so that it spreads effectively during road pavement.

Uses:-
Used in construction of roads & Soil stabilization. (2-4%).

(d) Plastic Bitumen:-

It consist of bitumen, thinner & mineral filler
→ The amount of mineral filler is 40-45%.

Uses:-
Used for filling of cracks & to control leakings.

(c) Straight run Bitumen:-

The bitumen that is distilled to a definite viscosity or penetration without further treatment.

Types of Bitumen on basis of Source:-

① Natural Bitumen:-

The bitumen that is obtain naturally from bitumenous rock.

- Pure natural bitumen is rare as limestone, Sand stone and other soil particles found with it.
- It is found with accumulation of petroleum on top layer of earth crust.

Properties:-

- Black in colour
- Usually soften on heating & harden on cooling
- Insoluble in water but soluble in inorganic solvent

② Petrolium Bitumen:-

It is obtained from petrium & its residues

→ Types:-

① Residual Asphaltum:-

These are brown or black solid bitumen obtain by atmospheric distillation of petroleum

after topping & gasoline, kerosine etc.

(b) Oxidized Bitumen:-

The bitumen i.e obtain by oxidation.

→ Usually air blown open petrolium residue.

(2) The petrolium thicken because of Polymerization & condensation.

(c) Crack Bitumen:-

Such bitumen is obtain by heating bitumen at high temperature.

→ Blowing air trough bitumen residue gives oxidized cracked bitumen.

Classification of basis of consistancy (18°C)

i. Solid bitumen.
ii. Semi solid
iii. Liquid bitumen

Classification on basis of Application:-

(a) Road construction bitumen.
(b) Building " ".
(c) Roofing " ".

Uses of Bitumen:-

- Used in construction of roads as binder
- Use in building construction & damp proofing filts.
- Used for stoping leakage & filling cracks

- Used in paints.
- Used as heat insulation material for buildings, refrigeration & cold storage equips.

Properties of Bitumen:-

① **Viscosity:-**
Usually soft at high temperature & get hard as temperature decrease

② **Ductility:-**
At low temperature it contains solid parafin which make it ductile

③ **Softening Point:-**
Bitumen should be soft so that can easily applicable

④ **Resilience:-**
- It can absorb and absorb itself due to movement & structure, which is because of Temperature, settlement or shrinkage

⑦ **Asphalt:-**
It is solid or semi solid product left behind during distillation of petrolium.

→ Black or brown in colour.
→ In composition it is mixture of bitumen,

- Used in paints.
- Used as heat insulation material for buildings, refrigeration & cold storage equips.

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Properties & Bitumen:-

① Viscosity:-
Usually soft at high temperature & get hard as temperature decrease

② Ductility:-
At low temperature it contains waxy portion which make it ductile.

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Bitumen should be soft so that can easily applicable.

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It is solid or semi solid product left behind during distillation of petroleum.

→ Black or brown in colour.
→ In composition it is mixture of bitumen

alumina, silica & lime.

→ At high temperature it gets soft & hard at low temperature.

→ Most used in today.

Types:-

① Natural Asphalt:-

also called native asphalt.

· It contain 7% bitumen, water & other impurities.

→ Can be purified by boiling or heating.

(It) the water content vaporize, impurities mix & bitumen remain down.

· It obtained from lake called lake bitumen.

Uses:-

· Flexible pavement, water proofing & structure.

② Refined Asphalt:-

It is obtained by heating pitch to remove water contents & impurities.

→ It contains 52% bitumen, 3% inorganic matter & 10% organic matter.

(6) Mastic Asphalt:-

It is manufactur by adding natural rocks into molten bitumen and then mix it to upto 4-5 hours at (200°C).

→ These are then placed in mold for cooling
→ It form a block (solid) that can be used after heating.
→ The block form is tough, durable & non absorbant of heat & noise.
→ When non bituminous limestone is added in molten bitumen called synthetic mastic asphalt.

(4) Liquid asphalt:-

It is viscous asphalt obtained from distillation of asphaltic base crude oil.
• It is sticky, black & highly viscous bitumen.

use:-
It is used in road construction.

(5) Cut back asphalt:-
It is combination of asphalt cement and petrolium or solvent.

→ We add solvent to reduce its viscosity
& it can easily spread
→ It contains 60% asphalt & remaining solvent

Use:-
Use where temperature is low as viscosity low so easily spread

6) Artificial Asphalt:-
It is obtain by evaporation of volatile constituents of coal tar
→ It contain 12% bitumen, 87% minerals & 1% organic matter

(7) Asphaltic Cement:-
It is obtained by oxidizing asphalt at high temperature
→ Use in filling & capping & in expansion joints in concrete

Properties of asphalt:-
→ Black or brownish in colour
→ Exist as solid or semi solid mostly depend upon temperature
→ Viscous on heating.

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(8) Cut back asphalt:-
It is combination of asphalt cement and petrolium or solvent

- Provide good insulation to heat, electricity & sound.
- It has resistance to acids.
- Partially soluble in carbon disulphide.
- It has high binding power.
- Not absorb water.

Uses:-

→ Used in construction of flexible pavement.
→ Used as DPC in building construction.
→ Used in paints.
→ Used as water proofing cover for roof.

⑤ Road metal:-

Road metals are crush stones, broken stones & brick that is used for construction of roads.

→ It provides base & sub base for road construction.

Uses & properties:-

These are provided to take the load of vehicle. They can take upto 30 tons/ft².