# Abrasive Wheels

# WELCOME

# Aim Of The Course

- **To enable operators to use abrasive wheels safely**
- **To enable operators who are designated to change abrasive wheels to do so correctly and safely**

# Health & Safety At Work Act As Applied To Abrasive Wheels

- **Provision And Use Of Work Equipment Regulations PUWER**
- **Electricity At Work Regulations**

# PUWER

- **Require that all equipment is fit to use**
- **Safe by design and construction, correct guarding in place, the required control systems in place and work effectively.**
- **The operator trained and competent to use equipment**
- **People who change abrasive wheels have additional training and are competent**

# PUWER

- **The equipment to be maintained to recognised standards**
- **Portable electrical equipment to be Portable Appliance Tested (PAT)**

# Operator Safety

- **All abrasive wheels have the inherent ability to shatter**
- **Guards on machines are there to protect the operator from the debris of the shattered abrasive wheel and coming in contact with the wheel.**
- **That's why all guards must be fitted and adjusted correctly before the machine is used**

# Operator Safety

- All operators are required to check over the equipment before use to ensure it is fit to use.
- All guards must be in position and effective before use
- There is no damage to the Abrasive wheel
- The controls are effective and working
- The correct wheel is fitted for the operation to be done and the speed of the machine spindle
- Impact resistant eye protection must be worn
- Don't forget about the hazards of noise, dust and sparks

# Operator Safety

- **Wear the required personal safety equipment and make sure its in good condition and fits you correctly.**
- **Don't wear any lose clothing which could become entangled with the revolving wheel don't forget pull cords on outdoor clothing**
- **You may require an appropriate fire extinguisher know how to use it**

# Operator Safety

- **Always allow abrasive wheels to free wheel to a stop and Never try to stop them**
- **Don't use excessive force when using the abrasive wheel**
- **Consider other people around you who maybe affected by your operations**
- **Don't forget where any sparks may go that may cause fires**

# Operator Safety

- **Most handheld machines require two hands to operate them correctly so protective gloves may be used while operating these machines, as the hands should never come into contact with the abrasive wheel.**
- **With fixed machines gloves should never be worn, because they could come in contact with the abrasive wheel**

# Operator Safety

**Bench mounted or pedestal machines must be securely mounted, the area around the machine must be kept clear, there must be adequate lighting.**

**Never use a grinder if there are chips out of the wheel, or grooving in the wheel.**

**The work rest must be no more than 3mm away from the wheel**

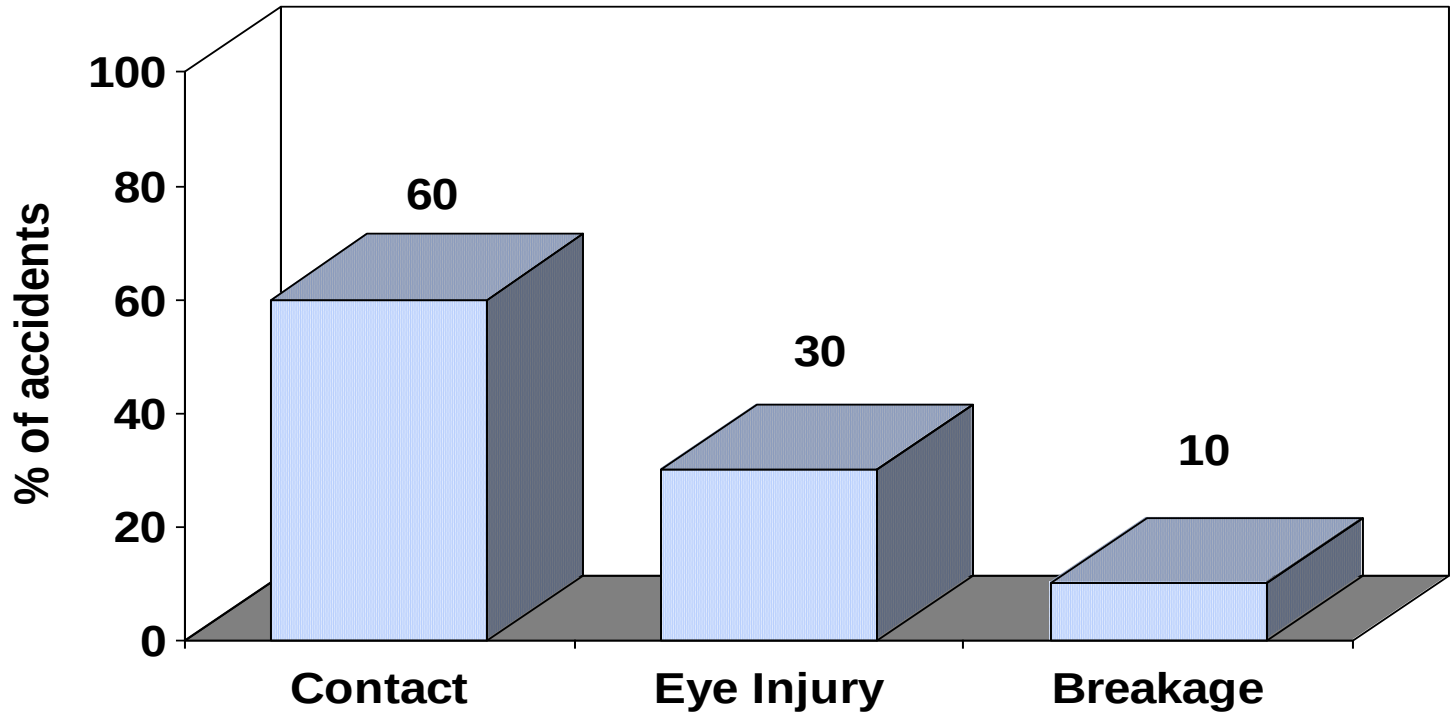
**Don't use excessive pressure.**

**No side grinding on the wheel unless specifically designed for this**

# Operator Safety

- **With air driven machines check any air regulators are set correctly and are working otherwise they can cause the wheel to over speed**
- **On petrol driven machines refuelling must be done with the engine turned off and away from the work area, with any spills cleaned up and the fuel can kept well away from work area**

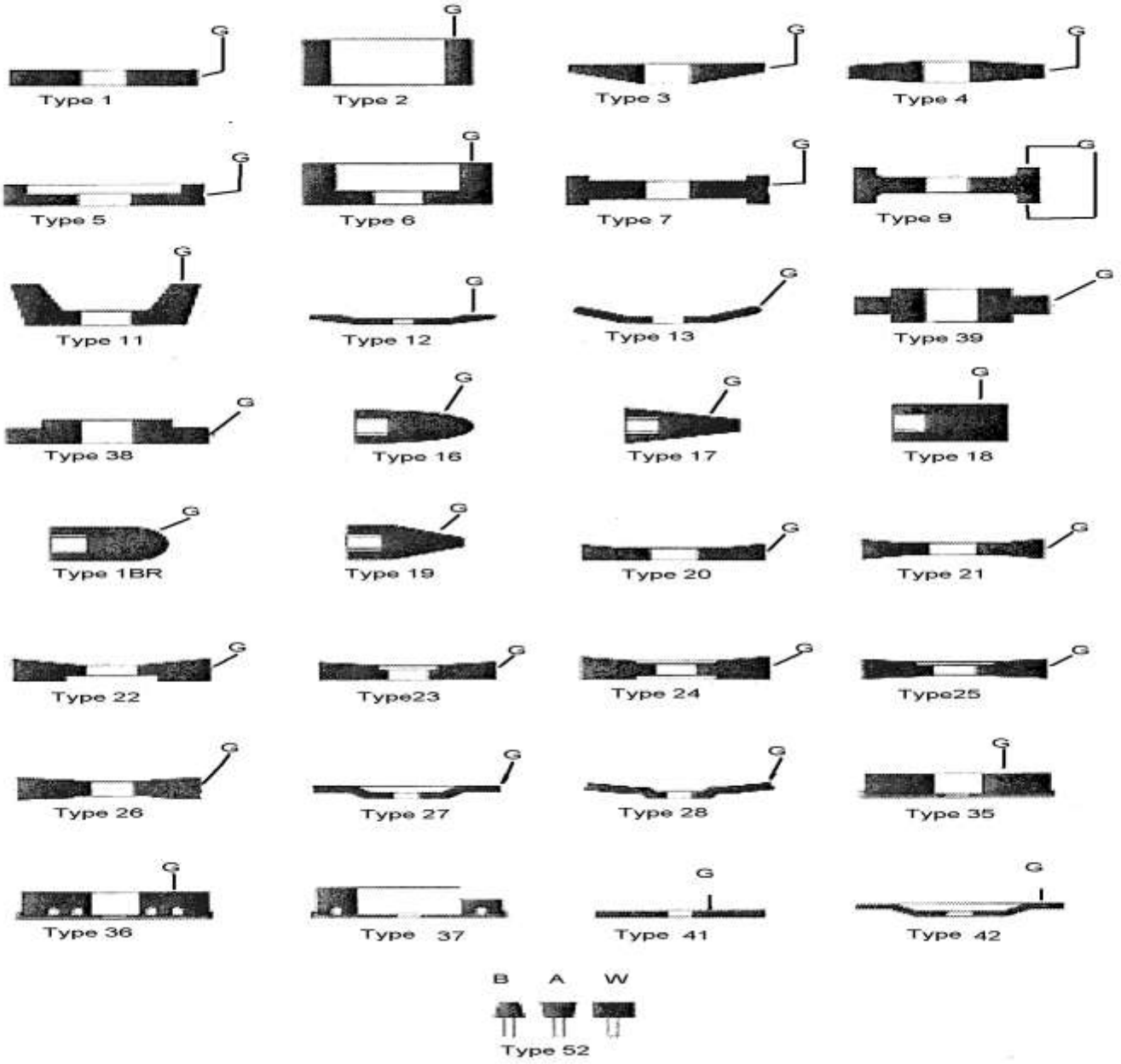
# Accidents Involving Abrasive Wheels



# Abrasive Wheels

- Abrasive wheels come in many different sizes and shapes and are made up of different types of abrasive to accommodate numerous grinding operations
- Its important that we select the correct type of wheel and abrasive to suite the machine and the task being undertaken

# Abrasive Wheel Shapes



# All Abrasive Wheels Are Marked To BS EN 12413 Part 1 (ISO 525)

- **These markings will give you all the information you require to select the correct wheel for the task at hand**
- **The wheel will also be marked with its dimensions including the spindle diameter**
- **And its maximum operating speed usually in R.P.M. AND METRES/SECOND**

| Order of Marking | 0 Type of Abrasive | 1 Nature of Abrasive | 2 Grain Size | 3 Grade | 4 Structure | 5 Nature of Bond | 6 Type of Bond etc* |
|---|---|---|---|---|---|---|---|
| Example | 51 | A | 36 3 | L | 5 | V | 23 |

| | |
|---|---|
| Aluminum Abrasive | A |
| Silicon Carbides | C |

| Spacing From The Closest To Most Open | |
|---|---|
| 0 | 8 |
| 1 | 9 |
| 2 | 10 |
| 3 | 11 |
| 4 | 12 |
| 5 | 13 |
| 6 | 14 |
| 7 | etc |

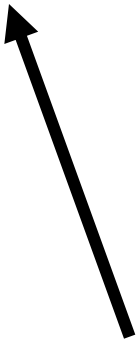
| | |
|---|---|
| V | Vitrified |
| S | Silicate |
| R | Rubber |
| RF | Rubber reinforced |
| B | Resinoid (synthetic resins |
| BF | Resinoid (synthetic resins reinforced |
| E | Shellac |
| Mg | Magnesia |

| Course | Medium | Fine | Very Fine |
|---|---|---|---|
| 8 | 30 | 70 | 220 |
| 10 | 36 | 80 | 240 |
| 12 | 46 | 90 | 280 |
| 14 | 54 | 100 | 320 |
| 16 | 60 | 120 | 400 |
| 20 | - | 150 | 500 |
| 24 | - | 180 | 600 |

| | |
|---|---|
| Additional Number For grain size Mixtures (optional) | 1<br>2<br>3<br>etc |

| Soft | | | | | | | | | | | Medium | | | | | | | | | | | | | | Hard |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |

# 41 A 60 1 J 8 V



**Type Of Abrasive**

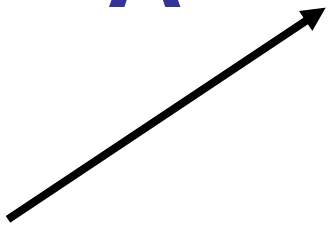
**(Shape of Wheel or Disc)**

# 41 A 60 1 J 8 V

**Nature of abrasive**

**2 basic types :**
**A = aluminium oxide**
**(White, brown, pink, ruby, semi-friable, Zirconia / alumina)**
**C= silicon carbide**
**(Black and green)**

**41 A 60 1 J 8 V**



**Grit Size**

**12 14 16 20 30 36 46 54 60 80 100 120**

**Very coarse**

**150 180 220 240 280 320 400 500 600**

**Very fine**

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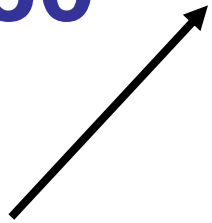

**Grain Count**

**Indicates mixing of abrasive sizes, e.g.**

**1 = straight grit**

**2 = mixture of marked size and next size finer, e.g.**
**60 + 80**

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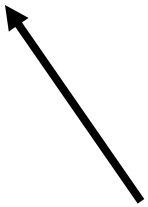


Grade

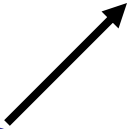
## Indication of wheel hardness

E F G H I J K L M N O P Q R S T U V W X Y Z

Very soft

Very Hard

# 41 A 60 1 J 8 V



Structure number

**Structure number is an indication of the level of porosity in the wheel;**

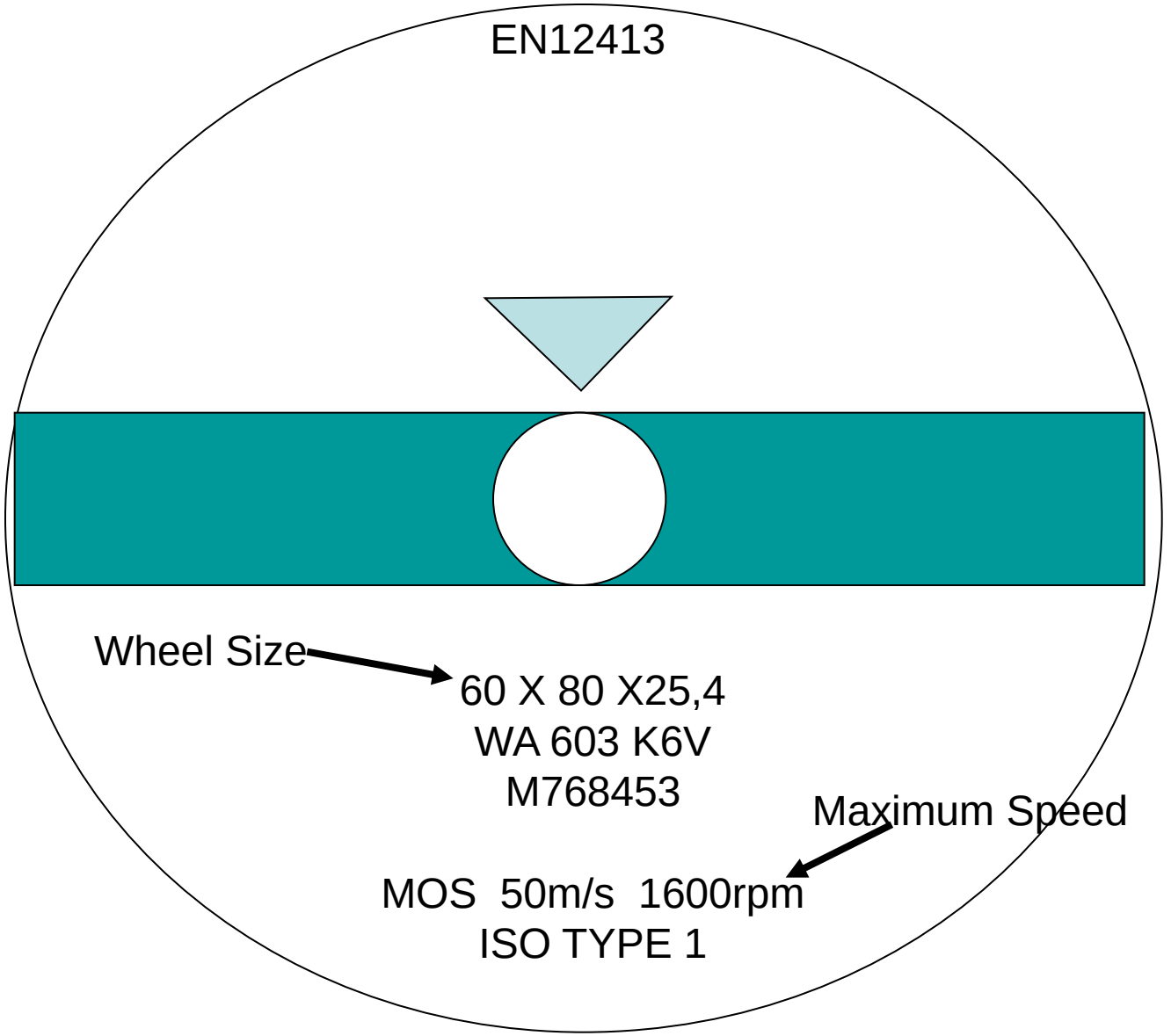
**0 = zero porosity, 99 = high porosity (65% by volume)**

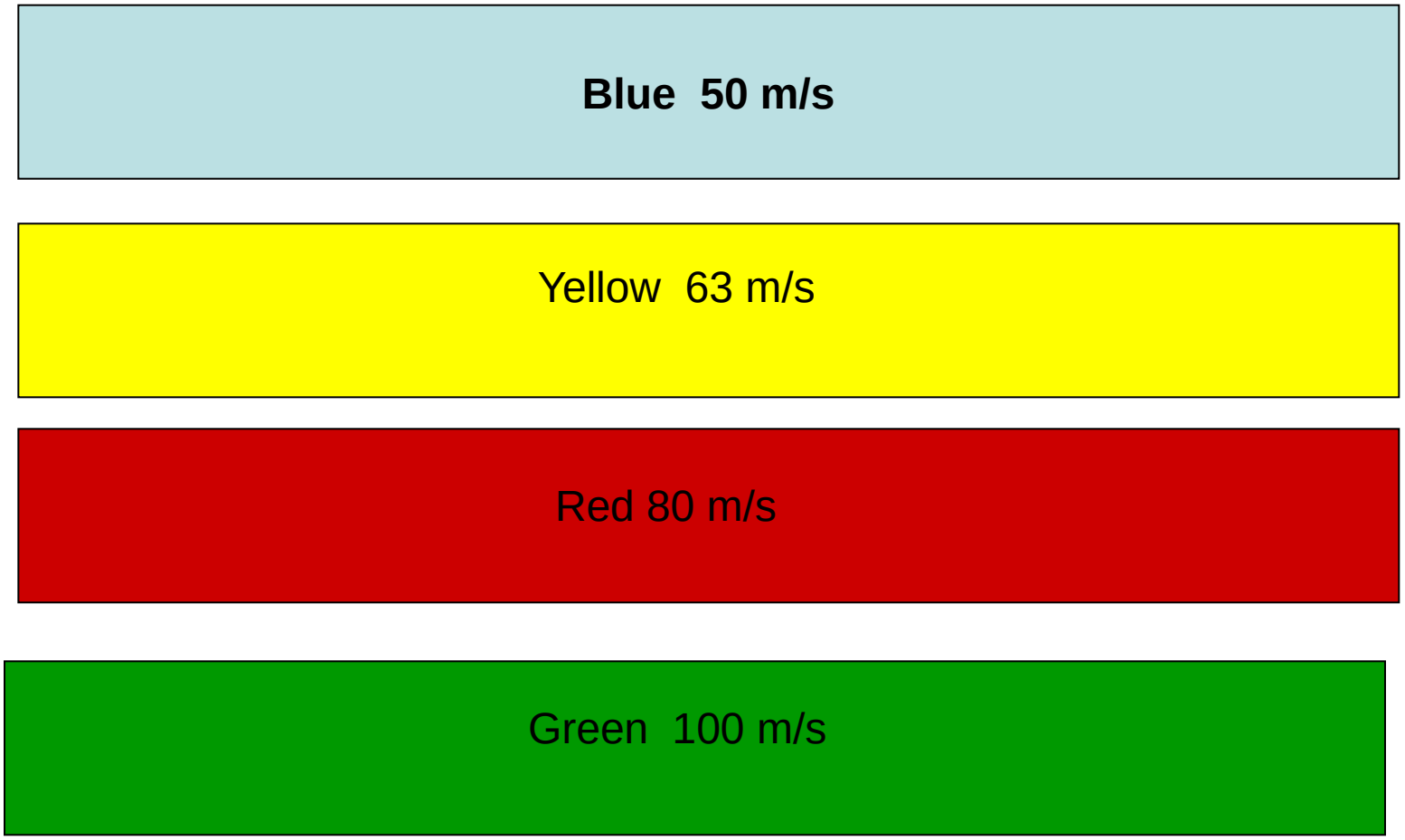
| | | |
|---|---|---|
| Vitrified | : | 4 - 12 |
| Vitrified (porous 2) | : | 40 - 99 |
| Resinoid & shellac | : | 2 - 14 |
| Rubber | : | 0 - 22 |

# 41 A 60 1 J 8 V

Bond Family

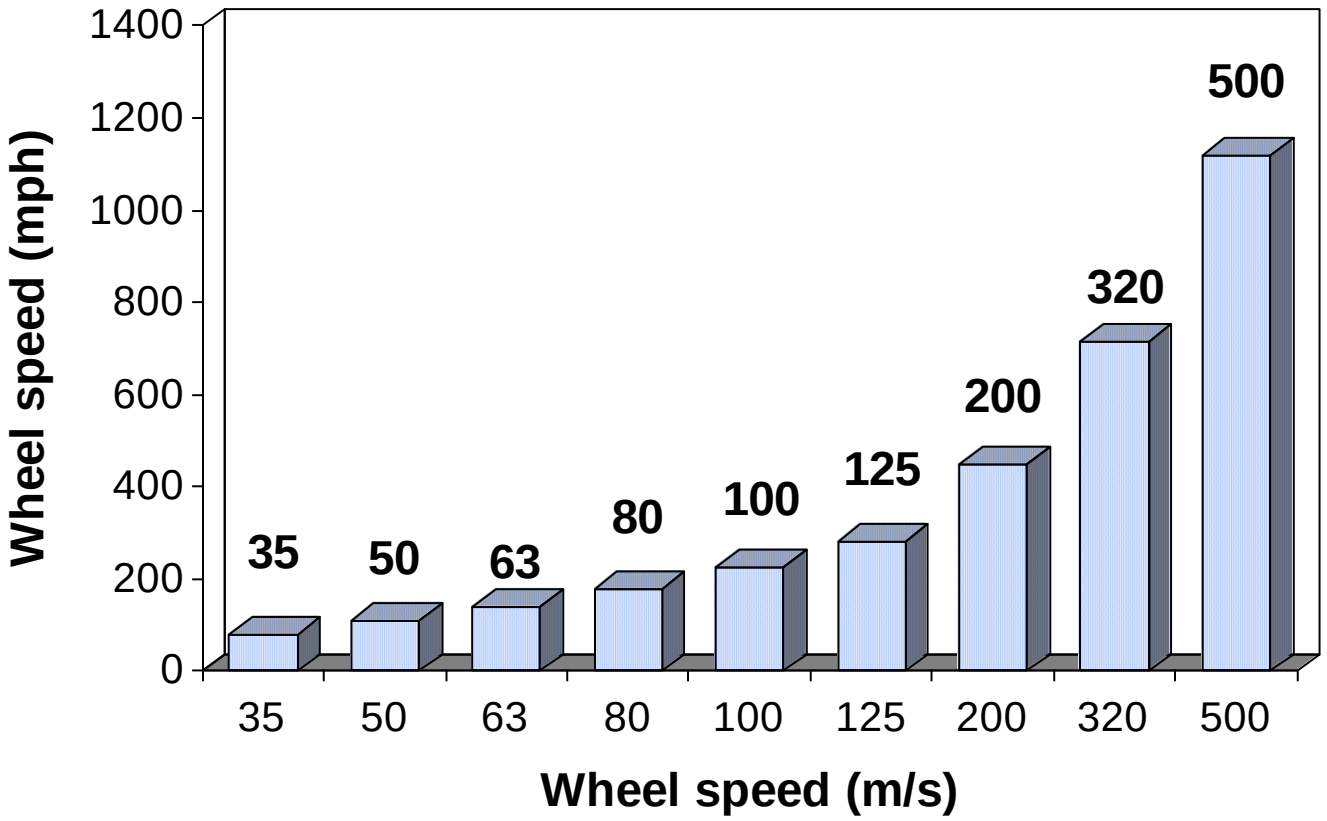
| | | |
|---|---|---|
| Vitrified | : | J, K, L, M |
| Resinoid & Shellac | : | A, C, G, H, S |
| Rubber | : | W, Y |


EN12413
Wheel Size
60 X 80 X25,4
WA 603 K6V
M768453
Maximum Speed
MOS 50m/s 1600rpm
ISO TYPE 1




# Colour Coded Speed Stripes

# Wheel Speeds



# Receiving And Storage

**All abrasive wheels must be handled and transported with care**

**All abrasive wheels should be inspected for damage etc., up on receipt in to the company.**

**They should be stored and transported correctly so as not to get damaged**

# Storage Suggestions

**The wheels should be stored off the floor**

**Not exposed to extremes of temperature**

**Not stored in direct sunlight**

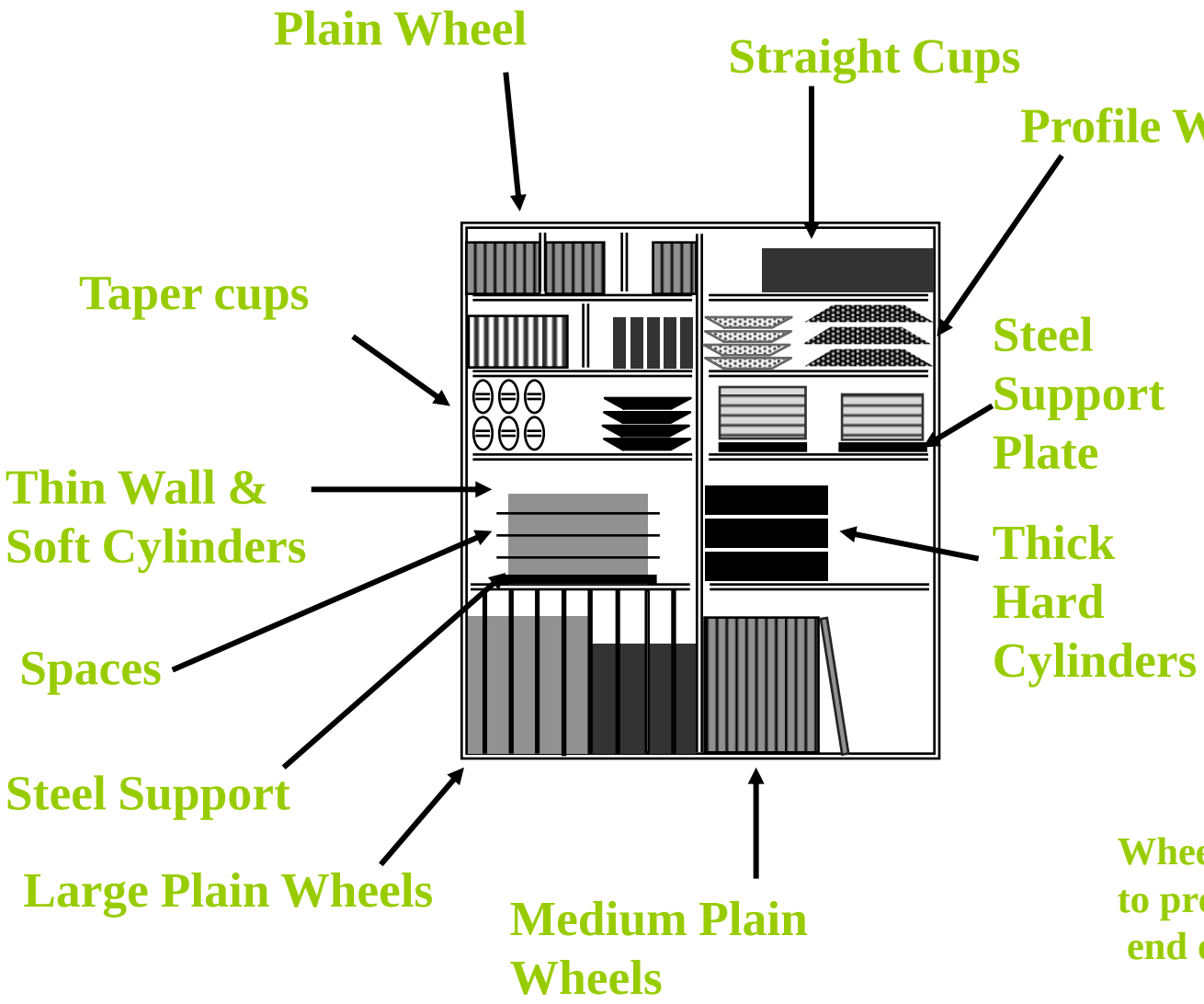
**They must be kept dry**

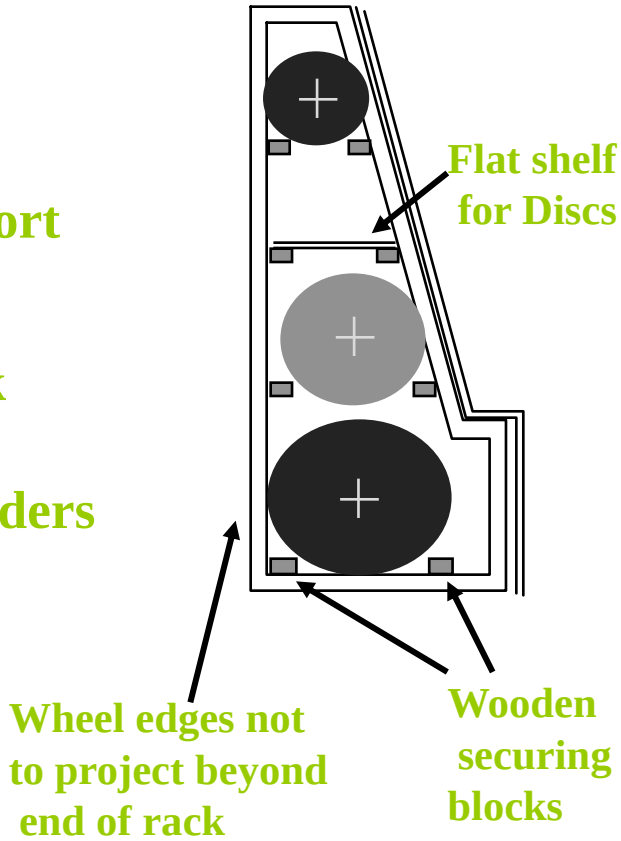
**Vitreous wheels should be date marked as to when they where received (recommended life span 10 years)**

**Organic wheels come with use by date**

**(max 3 year from date of manufacture**

# Typical Wheel Storage



# Speeds

**All machines must have their spindle speeds marked on them and can be easily checked using a hand held tachometer**

**On air driven machines it is essential that this is done regularly as wear in the exhaust port can cause over speeding**

**The spindle speeds MUST always be lower than the wheel being fitted**

# Organic Bonded Wheels

**These have a life span of three years from date of manufacture**

**They will have a use by date marked on them**

# Fitting Organic Bonded Wheels

**Isolate machine before starting**

**Obtain the correct type of wheel for the task**

**Inspect the wheel for any damage and staining**

**Ensure it’s the correct size for the machine**

**Clean all debris from inside guard and spindle**

**Check spindle bearings for wear**

**Check guard is in good condition and secure**

**Check flanges are flat no sharp edges they are the correct way around for the wheel being fitted**

**The threads on the spindle and nut need to be in good condition and not tight**

**Fit the wheel, sliding fit on the spindle**

**Fit retaining nut using key wrench do not over tighten the direction of rotation will tighten nut**

**Adjust guards to suite**

**Re energise the machine and then run it for one minute standing  away from the machine or holding the machine away from your body**

**If there where any faults in the wheel they should show themselves within that time**

# Fitting Vitrified Wheels

**Its recommended vitrified wheels have a life span of 10 years**

**Isolate the machine remove guards to gain access to wheel**

**Remove old wheel by releasing the retaining fastenings (some may be left hand thread)**

**Clean enclosure of debris and inspect to make sure its fit to reuse**

**Inspect spindle and bearings for wear**

**Threads on fastenings need to be good condition**

**Select the correct wheel for the task**

**Inspect the wheel for any damage, chips, and any staining indicating something has been spilt on the wheel which may affect the bond, if there is the wheel should not be used**

**Complete a Ring test on the wheel (light tap on wheel with non metallic object)**

**should produce a light ring sound if it’s a dull thud Don't use it**

**Vitrified wheels come with discs of thick paper each side (Blotters)**

**Blotters have a very important function and should be in good condition, they should be one third the diameter of the wheel**

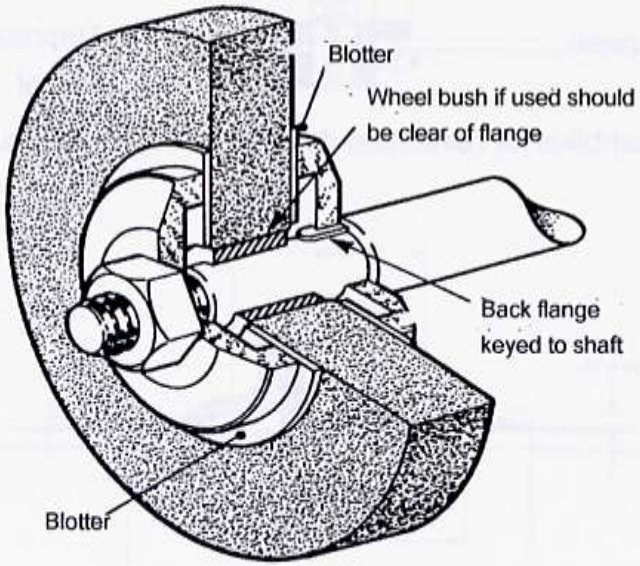
**Their function is to cushion the wheel against the flange and to transfer the rotatory movement of the spindle**

**The blotters should always be larger diameter than the flanges**

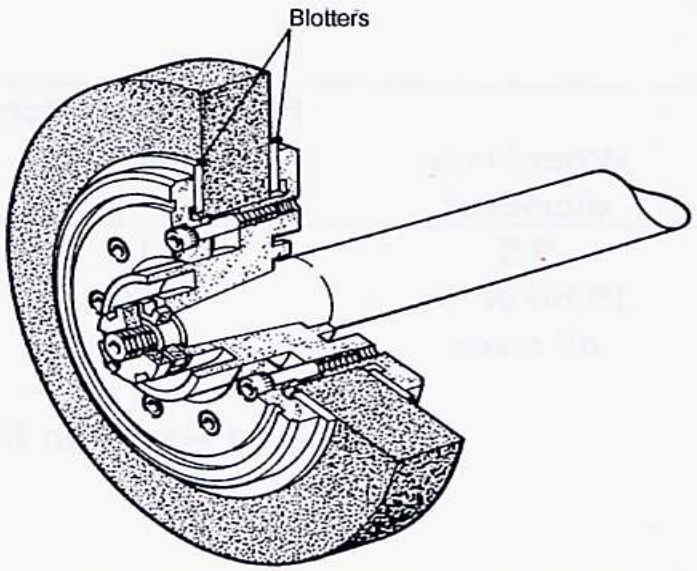
## Flanges

There are a variety of flanges, all are specific to the machine, wheel type a wheel size. The function of the flange is to transmit the maximum operati torque for a minimum clamping pressure.

Examples of flanges shown given below:




A straight-sided wheel with a small hole, correctly mounted




A method of mounting a precision wheel for external grinding

**The two flanges need to be exactly the same as each other**

**Their faces need to be flat (check with straight edge) and with no sharp edges that can damage the wheel**

**Slide the wheel onto the spindle nice sliding fit, with a flange each side of the wheel**

**Tighten fastenings holding wheel in place**

**(don`t over tighten)**

**Refit all guards securely.**

**Spin wheel by hand make sure nothing is catching it**

**Re energise the machine and run for one minute standing away from it, if ok stop machine allow to free wheel to a stop.**

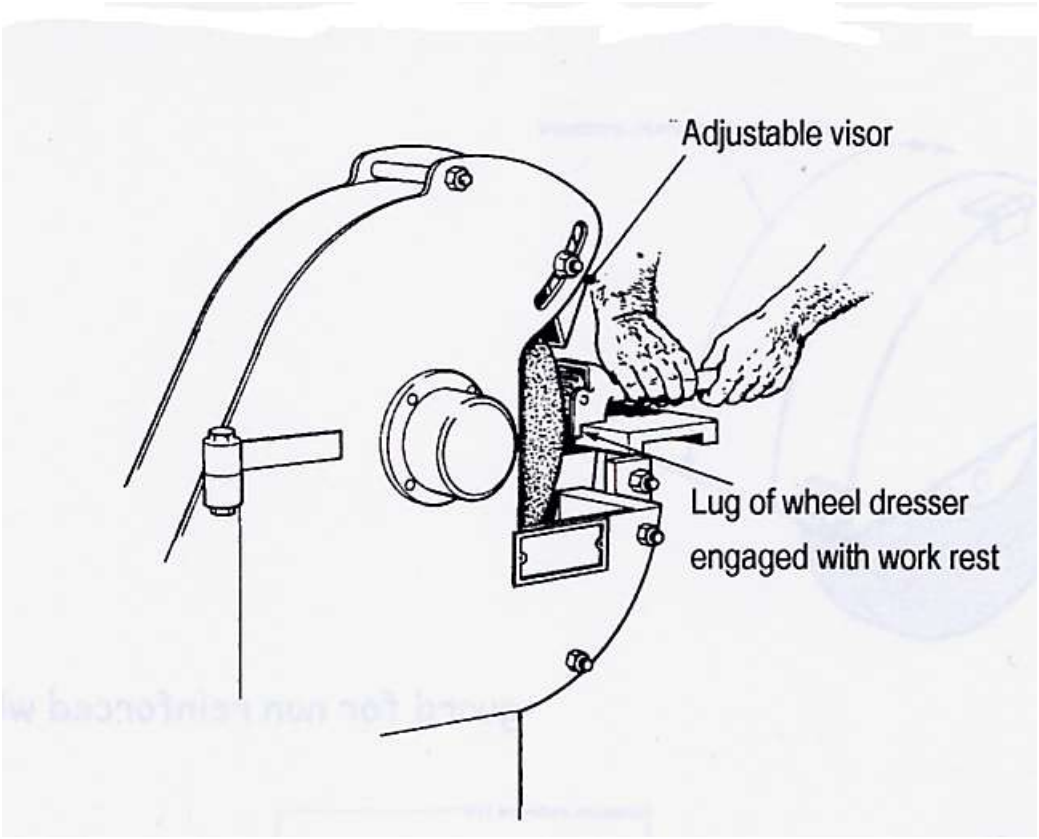
**We must know dress the wheel to make it run true to any work rests.**

**For this we use a star wheel dressing tool or a diamond tipped tool and even carburundem stone**

# Dressing A Wheel

**When wheels are fitted to fixed machines the wheel must be dressed so it runs true to the rest.**

**Wheels must also be dressed from time to time to remove uneven wear and grooves in the wheel**


Adjustable visor
Lug of wheel dresser
engaged with work rest

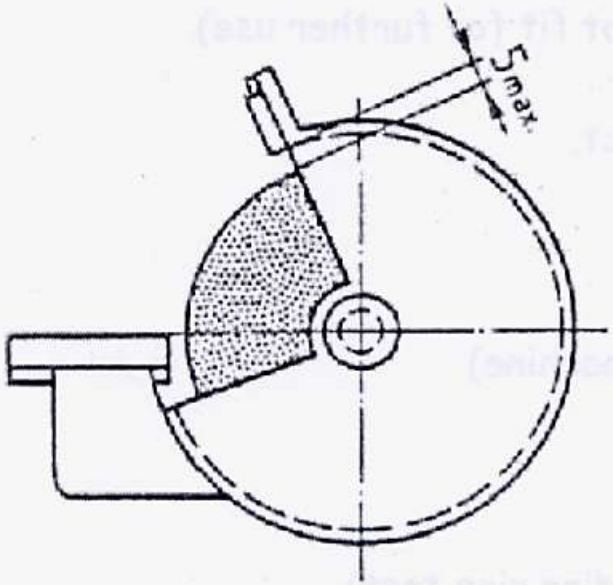



Fig. 49 Clearance between the periphery of the wheel and the adjustable end of the guard.

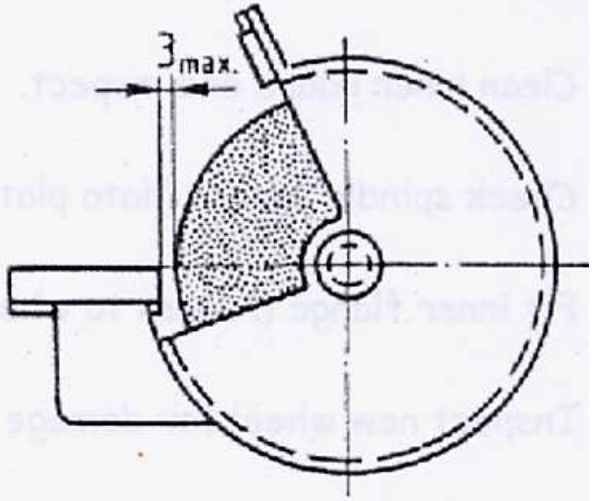



Fig. 33

# End of Session

## Any Questions?