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# A GUIDE TO DIAMONDS



*AA Thornton*

# INTRODUCING DIAMONDS

This Guide is designed to give you a brief overview of the journey a diamond takes from the heart of the earth to becoming a stunning item of jewellery; full of brilliance, mystery and the ultimate gift of love...

## THE FIVE-C'S ARE

CUT

CLARITY

COLOUR

CARAT WEIGHT

CONFIDENCE

In the beginning...

We shall begin our look at diamonds, at the very beginning of time, long before the dinosaurs, with the youngest diamond being formed no less than 500,000 years ago. It was over this period these amazing natural stones were formed by the great heat and pressure of the earth's primeval volcanic action.

The chemical composition of the extraordinary crystals formed in the molten rock were pure, crystalline carbon when these crystals grew, they produced the hardest natural substance known to man – the substance we call:

## DIAMOND





## WHERE DO DIAMONDS COME FROM?

Diamonds are not found all bright and shiny as we see them in the finished item of jewellery, in their natural, uncut, 'rough' state, they could be mistaken for pebbles.

The molten, volcanic rock in which diamond crystals were formed millions of years ago is called Kimberlite. This is bluish green in colour and is sometimes called 'Blue Ground' It can be found all over the world but only a small number of Kimberlite sites, or pipes as they are called, contain the precious crystals of diamond.



## WHY ARE DIAMONDS SO VALUABLE?

There are several reasons why diamonds command such high prices. Firstly, very few Kimberlite pipes contain diamonds, when they do, gem quality diamonds are only a tiny percentage of their yield. Secondly, diamond mines tend to be in very inhospitable places - beyond the Arctic circle, at the bottom of lakes or at sea and deep in arid deserts - this makes the cost of extraction very high. It is then difficult to extract the diamonds from the earth once a site has been discovered. The first task is to dig down from the top, recover the rock, crush it and extract the diamonds. When the hole becomes too deep, a shaft is sunk alongside the pipe and mining continues from the side.



However, not all diamonds remain locked within the Kimberlite pipes. Over millions of years some of the pipes have weathered and the diamonds have been washed away by rivers and floods, often as far as the sea. These diamond deposits are called alluvial.

*Alluvial Diamond*



Mining these alluvial stones presents particular problems. Not only are the diamonds mixed with sand and gravel, they are also buried under thousands of tonnes of the sand and gravel.

This page shows pictures of beach mining and what is called 'conglomerate'. This is the gravel, found just above the bedrock that includes the rough diamond crystals.

Deep water and ocean mining present other problems and require huge capital investment in ships and other technical equipment and in today's conservation-minded world the mining companies have to guarantee to restore the sites back to their natural state once extraction is complete, so adding to the final cost of mining.



# C1. CUT

Transforming rough diamonds into the bright, sparkling gems with which we are so familiar did not begin until the fifteenth century.



The early discoverers of diamonds in India over 2,500 years ago, focused on the double pyramid, octahedral crystals, as shown here, but of course broken crystals were also discovered and some of the natural facets on these stones showed how a diamond could sparkle if only it could be cut.

It was not until the early stone cutters discovered you could use another diamond and the diamond dust generated by the process to enable the cutter to grind facets onto the stones, the path towards the modern brilliant cut diamond began.

The first cuts were random flat shapes dictated by the original shape of the crystal, in which only the minimum of diamond was removed to create facets. Even at this early stage it was noted that some stones were brighter than others and it was then only a matter of time before the cutters discovered the best arrangement of facets to maximise a diamonds ability to reflect light. It is this effect, called refraction, which produces the flashes of brilliance that we call the fire in a diamond.

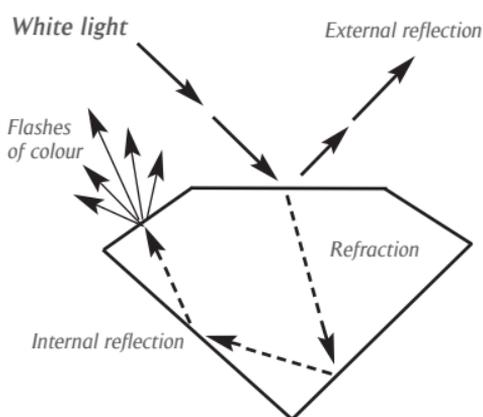
Rough diamonds are sorted into over 5000 different categories of shape, colour and clarity and in many cases more than one polished gem will be cut from a single piece of rough.

There are six basic shapes of rough diamond. These are called: Stone (1) Shape (2) Macle (3) Cube (4) Flat (5) Cleavage (6).



You can see these shapes illustrated above are some of the most likely polished styles that can be created from them, as illustrated on the opposite page.

The prime objective of the cutter is always to achieve the best sparkle or brilliance and the maximum size diamond or 'yield' from the rough.



On average however this will only use 35% to 43% of the rough diamond, depending on shape of cut. None of the residues are wasted and every last chip will be used in some form as part of the manufacturing process.



a.



b.

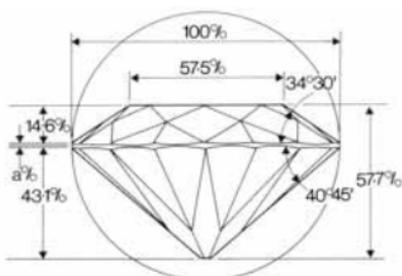


c.

Cutting a diamond is a highly skilled task, which takes many years to learn. Whilst technology has taken over some aspects of the job, it is still very much 'hands on' and the first task for the expert cutter is to mark the first cut on the rough crystal with Indian ink.

The factors he will consider, are the position of any natural inclusions (imperfections within the diamond) and internal features. He will also consider the proportions to achieve maximum yield and the direction of 'the grain', like wood diamonds have a grain.

If the first cut is to be made along the grain then the stone can be cleaved or split with a sharp blow on a prepared groove, just as you would split a log. However if the cut is across the grain then it will have to be sawn with a bronze cutting disc spinning at 5000 rpm and charged with diamond dust (See a).



The next stage is to put the first round edge to the waist of the stone, this lathe process is called bruting. (See b).

After this process has been completed the stone will be returned to the cutter to be assessed again and to check that the basic angles are correct

and if necessary, adjustments will be made. The rest of the process is carried out on a flat wheel (See c) and the facets are applied.

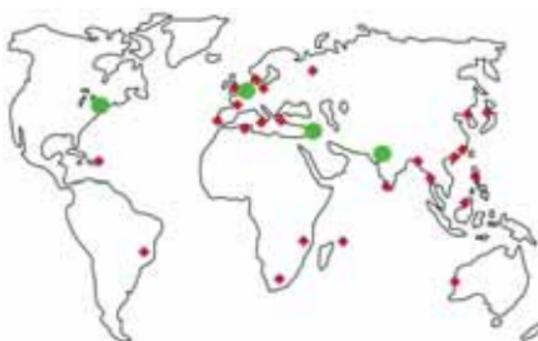


Today there are many different 'cuts' or shapes of diamond but the most popular are: Brilliant (1) Oval (2) Marquise (3) Pear (4) Emerald (5) Heart (6).

The angle and placement of the facets used to create these distinctive cuts has been developed over many years and are very precise. In all products

of nature, the raw material has an infinite variety. The skill of the cutter, is to achieve the maximum yield in weight and come as close as possible to the ideal

proportions as any deviation will have an effect on the value of the finished gem.



● Major Cutting Centres  
◆ Secondary Centres

# C2. CLARITY

CLARITY is the second of our diamond characteristics and probably the most difficult to agree upon, when it comes to assessing the value of a diamond. The clarity of a diamond, as with the cut and the colour, depends upon a subjective judgement made by an experienced grader against an agreed industry standard.

So what is clarity? Nature being what it is, the vast majority of diamond crystals have internal characteristics that indicate their growth. These 'inclusions' may be small particles of other minerals trapped within the diamond, or irregularities in the crystal structure itself.

There are two main international standards for judging the clarity of a polished diamond. The European standard dictated by CIBJO, while a more universally adopted scale is set by the Gemmological Institute of America (GIA). The two scales are very similar and it is the GIA scale which is shown here.

clarity grade	number and size of inclusions	discernable with a loupe <sup>1)</sup>	discernable with the naked eye <sup>2)</sup>	influence on brilliance
FL- IF	no inclusions	nothing to be seen	loupe clean	↓
VVS (VS 1+2)	very very small inclusions	very difficult to see	"eye clean"	
VS (VS 1+2)	very small inclusions	difficult to see		
SI	small inclusions	easily to see		
I 1	inclusions	recognisable at once	difficult to recognise	not influenced
I 2	larger and/or numerous inclusions	recognisable at once	recognisable	somewhat influenced
I 3	large and/or numerous inclusions	recognisable at once	very easily recognised	definitely influenced

<sup>1)</sup> ten time magnification, experienced grader

<sup>2)</sup> seen through the crown

As you can see from the chart, the scale ranges from 'Flawless' (under 10x magnification) to 'I3', which has internal marks that will be plain to the naked eye.



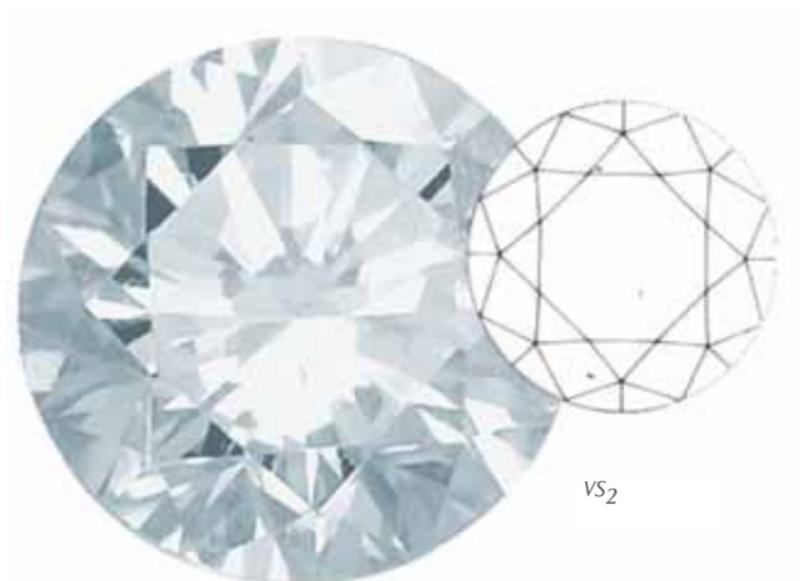
When looking at the internal characteristics of diamonds the standard tool is a chromatic (colour corrected) loupe or glass with a times ten magnification.

From the examples below, which illustrate small inclusions (S1-2 on the chart) you can see how difficult it is to assign a grade to a diamond, as no two are the same.

The median standard of diamonds in the UK is 'small Inclusions' - Si clarity. Therefore the vast majority of diamonds for sale will have some form of nature's finger print which can only be seen with great difficulty and under magnification.



Because of the way diamonds handle light, producing scintillating flashes of reflected brilliance, they are very hard to photograph in such a way as to show inclusions and you can see that even under extreme magnification it still requires a diagram to pinpoint the marks.



Inclusions should not be seen as faults; they are simply the work of nature. However, as with all things, the closer to perfection you get, the more valuable the item becomes and this is why flawless diamonds command the highest price.

# C3. COLOUR



COLOUR is the third of our five factors, which together with the quality of the cut and clarity, determine the value of a diamond. The best colour for a diamond is no colour at all, to the un-trained eye most diamonds look colourless.

CIBJO	GIA
Exceptional White plus	D
Exceptional White	E
Rare White Plus	F
Rare White	G
White	H
Slightly Tinted White	I
	J
Tinted White	K
	L
Tinted Colour	M
	N
	O
	P
	Q
	R
	S-Z
Fancy Colours	

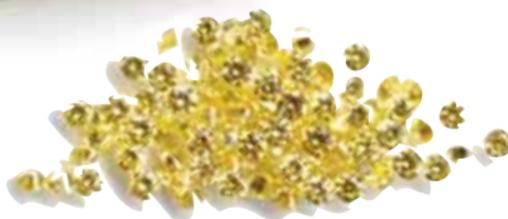
As with clarity, the colour of a diamond is judged using two main scales - CIBJO is the European system and GIA the American. The more universal GIA scale lists the top colour as 'D' with the other colours denoted by descending letters of the alphabet.

The judgment of a diamonds colour, although subjective, is based on comparison with a 'Master Set' of stones. Each master set is graded and matched to one of the internationally agreed standard and as each of the grades has a range it is important to know where the stones in each set sit on that scale. (See below) The asterisks \* denote each stones position within the grade.

The colours shown on these grading illustrations have been exaggerated. In reality diamonds of H colour and above can only be defined by an expert who must compare them with a master set.



Whilst the majority of diamonds are colourless, natural diamonds can be found in almost any colour, with pinks, yellows and black being quite widely used in jewellery making. Some colours, such as a natural deep red, are very rare and can command huge prices.



The discovery of diamonds in Australia in the 1970's brought to the market a number of strong colours particularly bright yellow and a deep brown, which is called 'Champagne'.



Pink diamonds also from the Argyle mine in Australia fetch a premium and are very attractive.

Very intensely blue diamonds are also found, but again are rare. In the case of these 'Fancy Colour' diamonds it is the intensity of the colour that sets the value.



# C4. CARAT WEIGHT

The carat is the unit of weight for diamonds. The name is derived from the seeds of the Carob bean, which are very uniform in weight and were used by early traders as the universal measure for the stone.

In the early part of the 20th century the carat became standardised to the metric weight of 0.20g.



*0.25 carat (4.1mm)*



*0.50 carat (5.15mm)*



*1.00 carat (6.5mm)*



*1.25 carat (7mm)*



*1.50 carat (7.4mm)*



*1.75 carat (7.8mm)*



*2.00 carat (8.2mm)*



*2.50 carat (8.8mm)*



*3.00 carat (9.35mm)*

As most diamonds are considerably smaller than a carat, the measurement is divided into 100 points:

One carat = 100 points

Half a carat = 50 points

Quarter of a carat = 25 points ...and so on.

These measurements are written as follows - 1ct, 0.50ct, 0.25ct

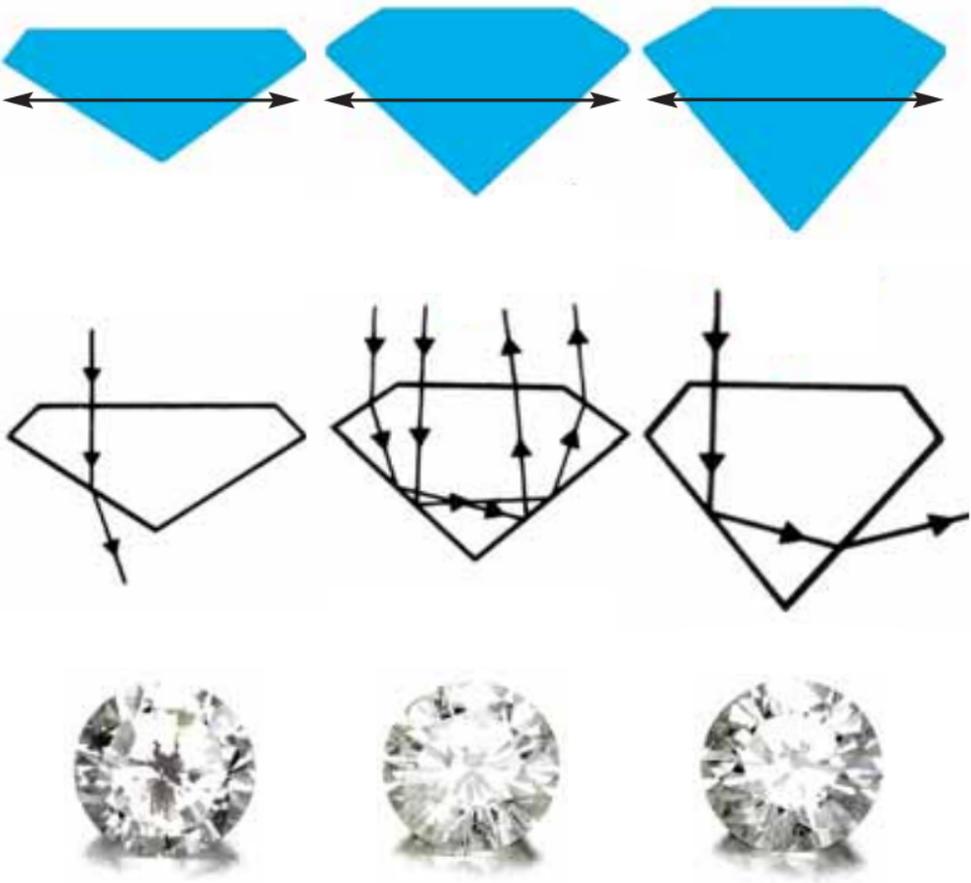
The weight of any loose diamond is easy to obtain but the weight of diamond that is set into a piece of jewellery can only be estimated by the use of specialist gauges. These measure the diameter squared x the depth x 0.0061. An adjustment then has to be estimated based on how close the gem is to ideal proportions.

As the chart shows, there is a correlation between the weight of a diamond and its visual size.. However the correlation only applies to those diamonds that have those 'ideal proportions' we looked at in the first section on cut.

The value of a diamond is calculated on all of its characteristics. We have so far looked at cut, clarity, colour and finally carat weight - but nature being what it is, the raw diamond crystal with which we began, is seldom perfect in all of these factors.

When the cutter begins his task, he will be aiming to produce a polished gem of the maximum clarity and the greatest weight, whilst at the same time always endeavouring to make it as bright and sparkly as possible.

In the diagram below the proportions are exaggerated to demonstrate the principle. In each case the diameter of the gem is the same, so looked at from above they will appear the same size. However, because of the other proportions, each gem will obviously have a very different weight.



In pure terms the one on the left of our diagram will weigh about half as much as the one on the right. In terms of value however the biggest is not the best.

As you can see from the next row of diagrams, the detour from 'ideal proportions' the cutter has had to make to achieve the best yield from the rough, effects the way the diamond will sparkle and it is the gem in the middle, that will fetch the highest price as its proportions best capture the light.

In reality these variations are not discernable except to an expert but they are essential for us to know when placing a value on an individual diamond.

# C5. CONFIDENCE

Buying diamonds is always an exciting event and often a very emotional one. The significance of diamonds in our society is that of a powerful symbol of love and of a promise that means forever.

Diamonds can also be a status symbol or a fashion statement, but whatever your motivation to buy, you need to feel the piece of diamond jewellery you choose fulfils all your desires.

In this book we have tried to give you an insight into how diamonds were formed, recovered and then fashioned into scintillating gems. The final stage is to set them into precious metals such as gold or platinum to become the item of jewellery you will treasure.



Bringing all these things together is our job and our passion. We use our extensive knowledge of diamonds and precious metals to bring you the very best we can in terms of craftsmanship, quality and style.

The ranges we have to offer have been carefully chosen and we can trace our supply chain right back to the source. We also subscribe to the Kimberly Agreement ensuring all our diamonds are ethically produced.

We are happy to put all of our expertise at your disposal and we will be glad to answer any of the questions you may have so that you can buy with confidence.



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