

Custom Motorcycle Frames for Custom Built Bikes

Once you have decided on the design of your bike, some technical details will need to be ascertained:

- Choose the front, and more important, the rear tyre
- Choose the wheels you want and make sure the wheel/tyre sizes match. Take account of the actual width and diameter of the tyres you are considering. Did you know that the diameter of a Metzeler 240/16 & 240/18 is very similar? Look at the enclosed chart and look at the comparison of actual tyre diameters compared with tyre manufacturers sizes. This will help you consider your choice of Fender. On the left side of this page is a comparison of tyre manufacturer's sizes and actual widths using the recommended rim size. There is a wide variation between those that are narrower than the model size and, on the sizes shown here, up to 13mm wider. These variations can be exaggerated further when you consider tyre growth when it gets warm in use or if you use a rim width that is wider or narrower than the manufacturers recommended size. Of course you may also be constrained by the rim sizes from your chosen wheel supplier. Spoke wheels using aluminium, chrome and stainless steel rims are not all available in identical rim/dia. combinations and the same is true for the wide variety of billet aluminium wheels. With a left side drive and a wide rear tyre being used the actual width of the tyre (in use + adequate clearance) is vital in determining your choice of frame/swingarm, fender and the primary and transmission offset. Manufacturers print tyre data books where detailed measurements are listed for each tyre. Maximum/optimum/minimum widths are also listed. If you can get hold of one of these it will prove very useful. If you can't get one, a major tyre specialist should be able to help you or contact the manufacturer's technical department by email. You need to be 100% certain of your tyre dimensions before you launch into some very expensive choices for other parts. Also note the legal and illegal tyre type combinations and these are shown on the adjacent chart.

Tyre data chart from Avon

Size	Service Description Load Index Speed Symbol	Rec Rim	Rim Width Range (ins)		Section Width		Overall Width		Overall Diameter		Static Loaded Radius		Revs. per		Maximum Pressure		Maximum Load		Maximum Speed		
			Min.	Max.	mm	ins	mm	ins	mm	ins	mm	ins	mm	ins	km	mile	bar	psi	kg	lbs	km/h
AM23 TRACK FORMULA																					
130/70 VB 18	(63 V)	MT3.50	3.00	4.00	130	5.1	138	5.4	648	25.5	314	12.4	511	822	2.9	42	272	600	210	130	
																	231	510	240	149	
																	204	450	260	162	
140/80 VB 16	(68 V)	MT3.50	2.75	3.75	143	5.6	150	5.9	633	24.9	302	11.9	527	848	2.9	42	315	694	210	130	
																	268	590	240	149	
																	236	521	260	162	
150/70 VB 18	(70 V)	MT4.00	3.50	4.50	141	5.6	149	5.9	661	26.0	317	12.5	502	808	2.9	42	335	739	210	130	
																	285	628	240	149	
																	218	480	280	174	
160/80 VB 16	(75 V)	MT4.00	3.50	4.50	159	6.3	166	6.5	650	25.6	309	12.2	516	830	2.9	42	387	853	210	130	
																	329	725	240	149	
																	252	555	280	174	
180/55 VB 18	(74 V)	MT5.50	5.50	6.00	169	6.7	179	7.0	667	26.3	321	12.6	496	798	2.9	42	375	827	210	130	
																	319	703	240	149	
																	244	537	280	174	
180/60 B 16	(74 V)	MT5.00	4.25	5.50	174	6.9	178	7.0	635	25.0	295	11.6	523	842	2.9	42	375	827	210	130	
																	319	703	240	149	
200/55 VB 18	79 V	MT6.25	6.00	6.50	191	7.5	205	8.1	665	26.2	319	12.6	498	19.6	2.9	42	437	963	210	130	
200/60 B 16	79 V	MT5.50	4.75	6.25	189	7.4	197	7.8	656	25.8	312	12.3	510	821	2.9	42	437	963	210	130	
																	371	819	240	149	

This is an excerpt from the Avon tyre data book. Note the amount of useful information and the differences between measurements for different tyre sizes. All tyre manufacturers produce such information. If you can get hold of one of these booklets, it will prevent you making any bad decisions about tyre/rim choice.

- Frame/swingarm. Which frame to use? Rake, top tube stretch, neck height. Make sure the frame you choose is made to take the tyres/wheels you wish to use. Some frames are available for either an Evo

or a Twin Cam motor and sometimes a Sportster motor. Some are only made for one of these. Decide on Left side drive or Right side drive. If using left side drive you may need to offset the primary and transmission. Right side drive will usually keep the engine central in the frame and keep both wheels centrally aligned. If your engine is taller than stock a frame with additional clearance is required. The parts/prices need to be ascertained

The looks and handling characteristics of your bike are affected by the decisions you make about these aspects of your frame.

Rake. This is the angle of the headstock relative to the vertical. Most stock bikes are about 30 degrees. Sports bikes can be less than 30 and a custom cruiser bike can be 45 degrees plus. Bigger rake bikes can be combined with extra rake triple trees to improve trail and increase fork length even more. The bigger the rake the longer the wheelbase, making cornering slower and increasing the turning circle. I have a friend with massive rake and very long forks who has to nearly stop at tight corners and put his foot down to stabilise the bike as he turns the corner. When deciding the frame rake do this in conjunction with the wheel/tyre size, fork length and rake of triple trees to ensure you have the optimum trail. Such information may be available from the frame suppliers or fork supplier. Look at [advice on fork length/trail](#)

Top Tube Stretch. Many frames are available with up to +6in top tube stretch. This makes the frame and wheelbase longer. When riding a bike with the maximum stretch, riding in a straight line will not be affected. However heavy braking will require some care and anticipation and cornering will be less precise. Turning circle will increase. From a style perspective the maximum stretch is often chosen. A good compromise of style/handling is to go for a 2in stretch. One point to note is that stretching the top tube will not move the forward control mounts any further forward, so riders with shorter legs need not be concerned. The handlebar mounts will move further away from the rider and that will require consideration later when choosing handlebars. Choose handlebars later when the seat is made and you are able to sit on the bike and measure where you want your hands to be in relation to the ends of the bars. A point also to consider is that a stretched frame will result in a gap under the headstock. Some consider this unsightly. As with many aspects of custom bike building this is another example of personal taste.

Neck Height or Down tube stretch Traditional chopper bikes have the distinctive higher neck and the long low look has a lower neck. Personal taste will dictate your choice. Handling characteristics will be affected by whatever option you choose and moderate variations from stock should not make your ride unsafe. Extremes of very high neck height will make handlebar choice important and can put uncertainty into bike steering.