

### Protection Philosophy agreed for implementation in Northern Region

S.No	Protection Setting	Reach & Time
1.	<b>Long lines Zone-1</b>	80% of the Protected line, Instantaneous
	<b>Zone-2</b>	100% of the Protected line + 50% of the shortest line emanating from the far end bus bar or 120% of the Protected line which ever is higher. Time Setting: 350ms for short lines ( $\leq 100\text{km}$ ) and 500ms for long lines $> 100\text{km}$ .
	<b>Zone-3</b>	120% of the protected line + 100% of the longest line emanating from the far end bus bar or 100% of the Protected line + 100% of the longest line emanating from the far end bus bar + 25% of the longest line emanating from the far end of the second line considered, which ever is lower. The zone setting to be limited such that it will not reach into the next voltage level. Time Setting: 1000m sec.
	<b>Zone- 3R</b>	25% of the Zone-1 reach. Time Setting: 1000m sec
2.	<b>Lines with Series and other compensations in the vicinity of Substation</b>	80% of the Protected line. 100ms-time delay for allowing correct distance measurement after the series capacitor is bypassed.
3.	<b>Power Swing Blocking</b>	Block tripping in all zones, all lines. Out of Step tripping to be applied on all inter regional tie lines Deblock time delay = 2s
4.	<b>Protection for broken conductor</b>	Negative Sequence current to Positive Sequence current ratio more than 0.2 ( $I_2/I_1 \geq 0.2$ ) Only for alarm: Time delay = 3-5 sec
5.	<b>Carrier Protection</b>	To be applied on all 400kV and 220kV lines with the only exception of radial feeders.
6.	<b>Back up Protection</b>	<ol style="list-style-type: none"> <li>1) On 400 &amp; 220kV lines with 2 Main Protections, back up Earth Fault protections alone to be provided. No Over current protection to be applied.</li> <li>2) On 220kV and lower voltage lines with only one Main protection Back up protection by IDMT O/C and E/F to be applied.</li> </ol>
7.	<b>Auto Re-closing with dead time.</b>	Single pole trip and re-closing Dead time = 1.0s. Reclaim time = 25.0s
8	<b>LBB Protection and bus bar protection</b>	To be applied on all 400kV and 220kV sub stations with the only exception of 220kV radial fed bus bars. LBB Current sensor $I > 20\% I_n$ LBB time delay = 200ms