

Appendix 4: Computation of weighting factor for L37.5 stage based on similarity with L40 stage; $c_j=1$, $k_{1j}=0.8$, $k_{2j}=1.2$

Sl. No.	SRIFs	Similarity Class	w_{ij}	ws_j	Rationale for the Weighting index
Engine Design features					
1	Engine combustion cycles	I	1	0.8	Both engines work with same combustion cycle
2	Engine Start/Shut-off transient hazards	I	1	0.8	The shut off transients are similar, with either command cut off or U- depletion
3	Propellant specific hazards; and Engine derating / uprating;	I	1	0.8	Same propellant used. Both engines operate at same thrust level.
4	Vehicle and Engine Interface & Interface hazards	II	0.8	0.572	Differences related to stage configuration and separate propellant tanks in place of common bulk head type propellant tank.
5	Design Method/Philosophy	II	0.8	0.572	Overall engine configuration is same. Stage engineered with separate propellant tanks for fuel and oxidiser. Design methodology same.
6	Environment (Temp, Load, Pressure, Vibration, shock, acoustic etc.)	III	0.4	0.051	Vibration & Acoustic levels are expected to be higher for L40. Thermal environment will also be higher due to heat radiated by the firing of core stage and strapon boosters.
7	Modelling/Analysis method	I	1	0.8	Identical
8	Minimum Margin of safety	I	1	0.8	Similar
9	Total No. of components	II	0.8	0.572	Marginally higher
10	Burn duration	III	0.4	0.051	Engine burn duration marginally higher at 160 secs in L40 as compared to 150 secs of PS2.
11	Overall Dimensional similarity of critical components	III	0.4	0.051	Changes due to stage systems being different
Materials and Manufacturing					
12	Materials used	I	1	0.8	Identical
13	Material Property Evaluation Method/Approach	I	1	0.8	Identical

14	Manufacturing Method used	I	1	0.8	Similar
Quality Aspects					
15	Extent of QA coverage	I	1	0.8	Identical
16	Extent of QC coverage	I	1	0.8	Identical
17	No. of qualification tests conducted	I	1	0.8	Identical
18	Matching of qualification test results with analytical prediction	I	1	0.8	Identical
19	NC management approach	I	1	0.8	Identical
20	No. of major NCs	I	1	0.8	Similar
Sum of values of criticality parameters ($\sum c_j$)		Sum of Weighting Score ($\sum ws_j$)		Weighting factor wf = $(\sum ws_j) / (\sum c_j)$	
20		13.071		0.654	

Note: $c_j = 1$, $k_{1j} = 0.8$, and $k_{2j} = 1.2$ for all SRIFs

ws_j computed for each SRIF using equation (5)