

| Selection | $1\ell + 2\tau_h$ | 4ℓ |
|-----------------------------|---|--|
| Targeted $t\bar{t}H$ decays | $t \rightarrow b\ell\nu, t \rightarrow bqq,$ $H \rightarrow \tau\tau \rightarrow \tau_h\tau_h + \nu's$ | $t \rightarrow b\ell\nu, t \rightarrow b\ell\nu,$ $H \rightarrow WW \rightarrow \ell\nu\ell\nu$ $t \rightarrow b\ell\nu, t \rightarrow b\ell\nu,$ $H \rightarrow ZZ \rightarrow \ell\ell qq \text{ or } \ell\nu\nu$ |
| Trigger | Single=lepton and lepton+ τ_h triggers | Single-, double- and triple-lepton triggers |
| Lepton p_T | $p_T > 25$ (e) or 20 GeV (μ) | $p_T > 25 / 15 / 15 / 10$ GeV |
| $\tau_h p_T$ | $p_T > 30 / 20$ GeV | — |
| Charge requirements | $\sum_{\tau_h} q = 0$ and $\sum_{\ell, \tau_h} q = \pm 1$ | $\sum_{\ell} q = 0$ |
| Jet multiplicity | ≥ 3 jets | ≥ 2 jets |
| b tagging requirements | ≥ 1 tight b-tagged jet or ≥ 2 loose b-tagged jets | |
| Missing transverse momentum | — | No requirement if $N_j \geq 4$ $L_D > 45$ GeV [†] $L_D > 30$ GeV otherwise |
| Dilepton mass | $m_{\ell\ell} > 12$ GeV | $m_{\ell\ell} > 12$ GeV and $ m_{\ell\ell} - m_Z > 10$ GeV [‡] |
| Four-lepton mass | — | $m_{4\ell} > 140$ GeV [§] |

[†] If the event contains a SFOS lepton pair and $N_j \leq 3$.

[‡] Applied to all SFOS lepton pairs.

[§] Applied only if the event contains 2 SFOS lepton pairs.