

Selection	3ℓ	$3\ell + 1\tau_h$
Targeted $t\bar{t}H$ decays	$t \rightarrow b\ell\nu, t \rightarrow b\ell\nu,$ $H \rightarrow WW \rightarrow \ell\nu q\bar{q}$ $t \rightarrow b\ell\nu, t \rightarrow bqq,$ $H \rightarrow WW \rightarrow \ell\nu\ell\nu$	$t \rightarrow b\ell\nu, t \rightarrow b\ell\nu,$ $H \rightarrow \tau\tau \rightarrow \ell\tau_h + \nu$'s
Trigger	Single-, double- or triple-lepton triggers	
Lepton multiplicity	Exactly 3 leptons	
Lepton p_T	$p_T > 25 / 15 / 15 \text{ GeV}$	$p_T > 20 / 10 / 10 \text{ GeV}$
Lepton η	$ \eta < 2.5$ (e) or 2.4 (μ)	
τ_h	No τ_h (loose WP)	$\geq 1 \tau_h$ (loose WP)
$\tau_h p_T$	—	$p_T > 20 \text{ GeV}$
$\tau_h \eta$	—	$ \eta < 2.3$
Charge requirements	$\sum_{\ell} q = \pm 1$	$\sum q = 0$ $_{\ell, \tau_h}$
Jet multiplicity	≥ 2 jets	
b tagging requirements	≥ 1 tight b-tagged jet or ≥ 2 loose b-tagged jets	
Missing transverse momentum	No requirement if $N_j \geq 4$ $L_D > 45 \text{ GeV}^\dagger$ $L_D > 30 \text{ GeV}$ otherwise	
Dilepton mass	$m_{\ell\ell} > 12 \text{ GeV}^*$ and $ m_{\ell\ell} - m_Z > 10 \text{ GeV}^\ddagger$	
Four-lepton mass	$m_{4\ell} > 140 \text{ GeV}^\S$	—

Selection	4ℓ
Targeted $t\bar{t}H$ decays	$t \rightarrow b\ell\nu, t \rightarrow b\ell\nu,$ $H \rightarrow WW \rightarrow \ell\nu\ell\nu$ $t \rightarrow b\ell\nu, t \rightarrow b\ell\nu,$ $H \rightarrow ZZ \rightarrow \ell\ell q\bar{q}$ or $\ell\ell\nu\nu$
Trigger	Single-, double- or triple-lepton triggers
Lepton multiplicity	≥ 4 leptons
Lepton p_T	$p_T > 25 / 15 / 15 / 10 \text{ GeV}$
Lepton η	$ \eta < 2.5$ (e) or 2.4 (μ)
Charge requirements	—
Jet multiplicity	≥ 2 jets
b tagging requirements	≥ 1 tight b-tagged jet or ≥ 2 loose b-tagged jets
Missing transverse momentum	—
Dilepton mass	$m_{\ell\ell} > 12 \text{ GeV}^*$ and $ m_{\ell\ell} - m_Z > 10 \text{ GeV}^\ddagger$
Four-lepton mass	$m_{4\ell} > 140 \text{ GeV}^\S$

* Applied on all pairs of leptons that pass loose selection.

† If the event contains a same-flavor opposite-sign (SFOS) lepton pair and $N_j \leq 3$.

‡ Applied to all SFOS lepton pairs.

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