

Engineered Steel Beam Web Opening

Hot Cutting JHA

Worked instructional example

Work and worksite

A qualified cutting crew will create one engineer-issued web opening in an identified stabilized building beam using the accepted oxy-fuel method from protected access. Load control, coatings and services are separately released. The specific cut sequence, retained steel and restrained offcut govern work through actual cut-edge and structural handover; no flange is cut. This fictional learning example describes planned controls; it records no actual inspection or work authorization.

- Current structural alteration details identify beam, exact opening geometry, retained load path, required temporary support and acceptance. Responsible personnel release support and loading before cutting; no crew-selected neutral zone or universal permissible opening size is supplied.
- The known steel, cleared surface and actual oxy-fuel equipment are suitable for the accepted method. Hot-work authorization, fume assessment, below-work fire control and an approved offcut-capture arrangement are established; no generic torch or gas setting is supplied.
- The structural modification connection 238120-29 is partial: creating this specified beam-web opening only. Flange cutting, cold connection drilling, beam removal, unknown coatings, strengthening installation, confined-space cutting and structural-load release are excluded.

Questions before work

- Which actual engineering and support records release this exact web opening and retained load path?
- How is the cutout restrained before its final separation without unauthorized attachment to the retained beam?
- Who verifies cut geometry and required structural disposition before any later loads or reinforcement work?

Task Hazard Control

1 Release the specific structural opening

Hazard: An opening chosen from field convenience can remove load-resisting steel or interfere with a supported structure beyond the intended alteration.

Control: Structural lead identifies the beam and current issued opening detail, support condition, load restrictions and actual acceptance requirements. Confirm that required surveys, services and material clearances are complete before hot work. Resolve discrepancies with the responsible engineer; neither an existing penetration nor a generic beam sketch authorizes a new opening.

Verification: Lead verifies actual opening identity and support and load-release evidence.

Reasoning: The permitted retained steel is established by design before cutting starts.

2 Control access fire and fume exposures

Hazard: Hot slag, hidden combustibles or an exposed work position can injure the cutter and people beyond the visible beam face.

Control: Crew establishes protected access, required worker protection, the below-work and opposite-face boundary and the accepted fire-watch and emergency arrangements. Assess fume exposure for the actual cleared steel and method and provide specified ventilation and protection. Remove or protect combustibles throughout the spark path and coordinate neighboring work; an unoccupied area below still needs controlled hot-work exposure.

Verification: Hot-work lead checks the full fire, fume and access arrangement before release.

Reasoning: The cutting exposure extends beyond the marked opening and the operator's position.

3 Verify equipment and the restrained cutout plan

Hazard: Defective hoses, incompatible torch components or an unsupported cutout can create fire, pressure leakage or a falling hot object.

Control: Qualified operator checks the identified oxy-fuel assembly through its actual instructions and applicable requirements, including torch, hoses, regulators and secured cylinder arrangements. Prepare only the engineer-accepted cutting and offcut-capture method, with no unauthorized drilling or welded attachment to retained steel. Confirm the planned support remains effective through final separation; hold equipment or capture defects before lighting.

Verification: Lead verifies equipment findings and the actual controlled offcut arrangement.

Reasoning: The cutout must have a safe destination before the perimeter is completed.

Complete the work and hand over

4 Cut the issued geometry through the prescribed sequence

Hazard: Cutting outside limits, unexpected member movement or premature offcut separation can damage the beam and release hot steel toward people.

Control: Operator follows the exact issued cut boundary and accepted oxy-fuel method while assigned observers maintain support, exclusion and stop communication. Keep the offcut controlled before its final release and use the actual permitted sequence and positions. Stop for unexpected response, changed geometry or lost support; do not enlarge a tight opening or trim a flange to clear a service.

Verification: Assigned lead records prescribed cut and support observations at actual hold points.

Reasoning: A controlled cut follows the design rather than adapting the beam around a field obstruction.

5 Inspect the actual opening and hold structural use

Hazard: A rough, damaged or incorrectly sized edge can conceal an unaccepted opening that later trades treat as complete and ready for load changes.

Control: After safe equipment shutdown and required cooling, assigned personnel perform the actual specified opening and cut-edge checks from protected access. Record deviations and obtain the responsible technical disposition before any correction or structural use. Maintain required temporary support and load holds; additional cutting, welding or strengthening needs its separately accepted method and release.

Verification: Responsible authority reviews required findings and records actual opening disposition.

Reasoning: Cut completion alone cannot establish the modified beam's accepted condition.

6 Complete hot-work closeout and transfer restrictions

Hazard: Residual hot material, unattended fire exposure or unclear support ownership can injure cleanup workers and permit an unready structural load change.

Control: Crew handles the restrained cooled cutout through the accepted route, collects slag safely and secures oxy-fuel equipment under its actual shutdown instructions. Complete required fire-watch closeout and record unresolved structural or hot-work actions. Transfer opening status, retained support, loading restrictions and separate strengthening or service-installation work to the receiving lead; release remains with the responsible authority.

Verification: Receiving lead confirms fire closeout and continuing structural restrictions.

Reasoning: The handover closes cutting without silently authorizing later beam loading.

Pause and reassess

- Exact opening geometry, retained-load-path release, support acceptance or service and material clearance is missing.
- Cut response, offcut restraint, geometry, support or hot-work exposure differs from the accepted method.
- Protected access, fume controls, fire watch, communication or required structural disposition cannot be maintained.

Improve the controls

Needs improvement: Keep the hole in the middle and it should be fine.

More useful: Use the issued opening geometry and actual engineering support and load-release evidence.

Needs improvement: Cut the last edge and let the slug fall.

More useful: Verify the approved offcut-capture arrangement before final separation and maintain the controlled hot-object route.

Decisions that change the analysis

Can the opening be enlarged to fit the actual service after the issued cut is finished?

Keep the mismatch held and obtain the responsible structural and service-coordination disposition. Enlarging the opening removes additional retained steel and changes the accepted alteration. This example provides no neutral-zone rule, flange-trimming permission or generic torch setting; any revised geometry and correction method require their actual design and readiness releases.

What must the crew record for actual use?

Record beam and opening identities, current alteration details, actual support and load-release basis, service and material clearance, qualified roles, equipment and hot-work findings and offcut restraint. Document required cut-edge checks and dispositions, fire closeout, retained supports, receiving lead and later-work holds; prefill no accepted structural result.

Training needs

- Instruction for qualified cutting personnel on the issued structural cut sequence, specified retained limits, protected access and controlled offcut separation.
- Actual oxy-fuel equipment and hot-work instruction on pre-use condition, cylinder and hose protection, fume controls, stopping and fire-watch closeout.

Confirm applicable qualifications and actual training evidence for the people assigned. Related toolbox talks support discussion; they do not establish competence.

References and adaptation

AISC Engineering Journal: design basis for beam-web openings, article overview
<https://ej.aisc.org/index.php/engj/article/view/1293>

OSHA 1926.350 Gas welding and cutting equipment
<https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.350>

OSHA 1926.352 Fire prevention in welding and cutting
<https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.352>

OSHA 1926.353 Welding and cutting ventilation and protection
<https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.353>

References reviewed October 12, 2026. Use actual equipment and product instructions, project design and site requirements. This original draft supplies no fabricated inspection, signature or approval.