G100 - 70S, Gas Metal Arc Welding (GMAW) Welding Process Emission Factors

**CALCULATION METHODS**

Annual Emissions: \( E_a = U_a \times EF \) (lbs/lb rod) x (1-e)

Hourly Emissions: \( E_h = U_h \times EF \) (lbs/lb rod) x (1-e)

\( E_a = \) Annual emissions of each listed toxic air contaminant per welding rod, (lbs/year)

\( E_h = \) Maximum hourly emissions of each listed toxic air contaminant per welding rod, (lbs/hour)

\( U_a = \) Annual usage of each welding rod, (lbs/year)

\( U_h = \) Maximum hourly usage of each welding rod, (lbs/hour)

\( EF = \) Emission Factor (lbs/lb rod)

**Emission Factors:**

(1) Complete AP-42 information from Final Section 12.19 (1/95): \( EF = \) Trace Metal EF (Table 12.19-2)

(2) Incomplete AP-42 Final Section 12.19 (1/95): \( EF = \) FGR (Table 12.19-1) x FCF x Ci (MSDS)

(3) No AP-42 information but known welding process: \( EF = \) FGR (District Default) x FCF x Ci (MSDS)

(4) District Study or AWMA information: \( EF = \) Trace Metal EF

(5) Incomplete District Study information: \( EF = \) FGR (District Study) x FCF x Ci (MSDS)

(*) Incomplete AP-42, District, or AWMA Hexavalent Chromium information: \( EF = \) Cr (Total Chromium in Fumes) EF x HCR

**NOTES:**

- Emission factors assume "uncontrolled" releases. Emission control methods and efficiencies reported are be applied within the emission calculations.

- Fume generation rates (FGR) are based on the following:
  - EPA AP-42 Final Section 12.19 (1/95) Table 12.19-1 (PM10 EF)
  - ARB, Richard Bode: 0.01 (GMAW, TIG, MIG), 0.02 (SMAW, FCAW), 0.00005 (SAW), 0.05 (unspecified)

- Fume Correction Factors (FCF) per District engineering discussions with Industry:
  - 0.5464 (GMAW, TIG, MIG), 0.2865 (SMAW, FCAW, SAW), 1.0 (unspecified)

- Trace metal emission factors are based on the following:
  - AWMA Volume 59, 2009, Issue 5 (Pages 619-626) Table 2 and Table 3
  - EPA AP-42 Final Section 12.19 (1/95) Table 12.19-2
  - District engineering estimates using rod compositions (Ci) from MSDS

- Hexavalent chromium conversion rates (HCR) are per District engineering reviews of studies on welding:
  - 0.05 (GMAW, TIG, MIG), 0.55 (SMAW), 0.0005 (SAW), 0.10 (FCAW, unspecified)

**POLLUTANT** | **DISTRICT EMISSION FACTORS (lbs/lb rod)** | **REFERENCE DOCUMENT** | **FACTOR** | **(UNITS)** | **COMMENTS**
---|---|---|---|---|---
NOX | | | | | 
CO | | | | | 
SOX | | | | | 
TOG | | | | | 
VOC | | | | | 
TSP | 5.20E-03 | | | | Assume PM10 = TSP
PM10 | 5.20E-03 | EPA Table 12.19-1 (1/95) AP-42 | 5.2 | lbs/1000 lbs rod | Assume PM10 = Fume Generation Rate (FGR)
Al | | | | | 
Al2O3 | | | | | 
Be | | | | | 
Cd | | | | | 
Co | 1.00E-06 | EPA Table 12.19-2 (1/95) AP-42 | 0.01 | 0.1 lb/1000 lbs rod | District Procedure (1) EF = Trace Metal EF
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**REFERENCES:**
AWMA: https://www.tandfonline.com/doi/abs/10.3155/1047-3289.59.5.619

Last Updated on 07/07/2022 by A.Weller