

# Material / Component Traceability

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# Material Traceability

- Material traceability is crucial for ensuring **product quality, safety, and compliance** across industries, from manufacturing to food production.
- It allows businesses to track materials and products throughout their lifecycle, facilitating effective recall management, risk mitigation, and enhanced transparency for operators, consumers, and regulators.

## Key Aspects of Material Traceability include:

- Quality Control
- Compliance
- Supply Chain Management / Transparency
- Risk Management
- Efficiency & Cost Reduction



In the Pipeline Industry - Material Traceability is the ability to trace all materials used to construct a piping system back to their origins.

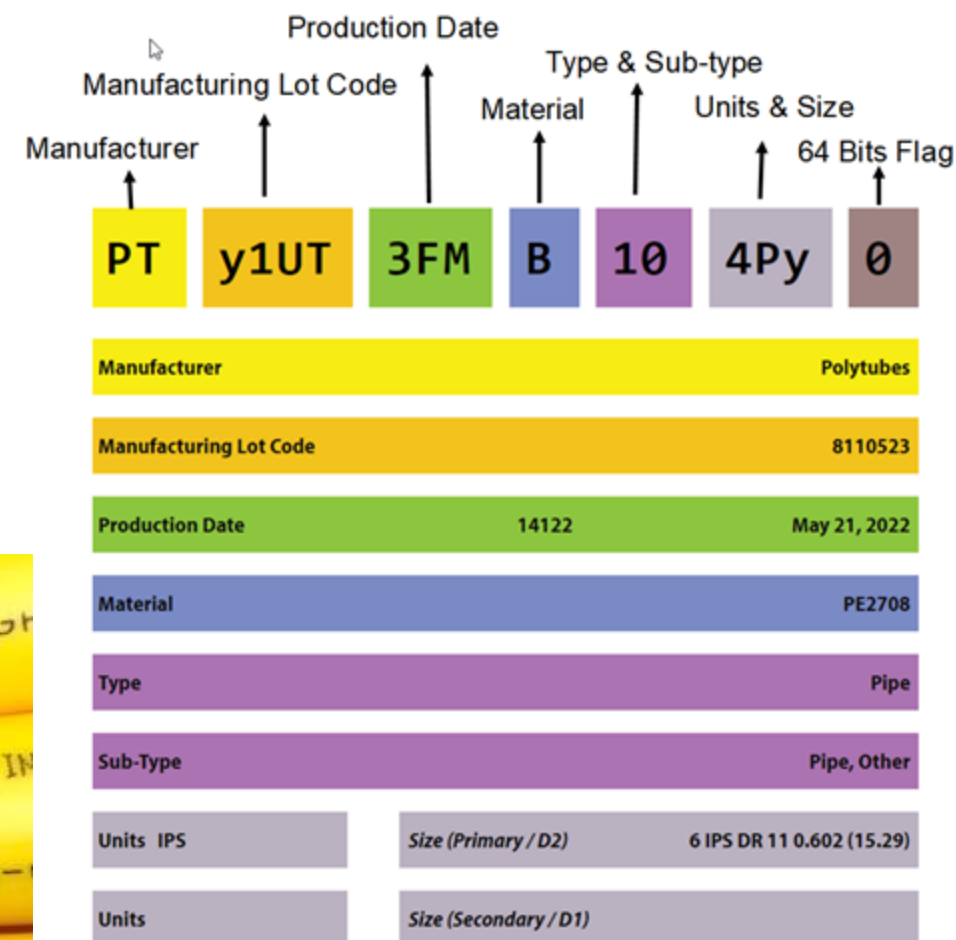
# Implementation of Material Traceability

- Data Capture Technologies:
  - Utilizing systems like barcodes, QR codes, or RFID to capture and record data at every stage of the production process is crucial for effective traceability.
- Software and Systems:
  - Implementing robust traceability platform that integrates with various business processes, including manufacturing, inventory, and logistics, is essential for efficient data management and analysis.
- Benefits of Traceability:
  - Improved product quality and safety.
  - Reduced risk of recalls and associated costs.
  - Enhanced compliance with regulations and standards.
  - Increased customer satisfaction and brand loyalty.
  - Greater visibility into the supply chain and identification of inefficiencies.



# Plastic System Traceability – F2897

- The ASTM F2897 standard provides a traceability encoding system of natural gas distribution components ( plastic pipe, fittings, valves, and appurtenances) with an aim to standardize the way manufacturers mark their respective products in a uniform manner.
- Allowing gas utilities to more efficiently collect, store and query pertinent information on the components installed.





# Data Acquisition using Barcodes – Food & Pharmaceutical

**A wide range of Products & Manufacturers identified Using GS1 standards**



Today, the products (millions) in the Grocery, Pharmacies, Automotive, and E-Trade Industries are identified and barcoded by 10,000's of manufacturers worldwide.

**Do these pictures have parallel's when it comes to identification**

# GS1 Standards

## How GS1 Standards Work

- GS1 standards create a common foundation by uniquely identifying, accurately capturing and automatically sharing vital information about products, locations, assets and more.

## GS1 Benefits

- One of the key benefits of GS1 standards is that they are global in nature.
- Another benefit is that they are flexible and adaptable



# The Global Language of Business

**GS1 is a Global Standard that is used by other Industries for Decades**

**Used in over 155 Countries**

**10 Billion barcodes scanned daily**

**2 Million + companies worldwide use GS1 standards**

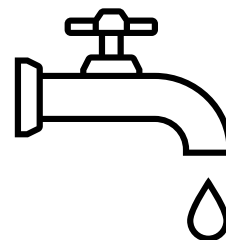
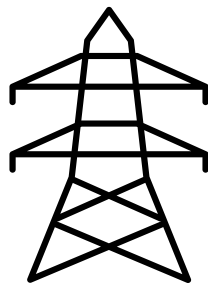
**Over 1 Billion products carry GS1 barcodes**

**50 + Years – GS1 started in 1973**





# One Identification Specification For All Industries



- **Product Identifier**
- **Date of manufacturer**
- **Location of manufacturer**
- **Batch identification**
- **Serialization**
- **Component Definition**
- **Document identification**



amazon

Walmart





# Benefits of GS1 Based Material Traceability

GS1 adoption supports numerous business and operational functions:

- **Standardized Asset Identification**  
Enables consistent, interoperable tracking of pipes, valves, meters, joints, and other utility assets using global identifiers.
- **Precise Geolocation + Depth Mapping**  
When paired with GNSS and RFID, EPCIS can log the exact install location and burial depth—critical for safety, maintenance, and damage prevention.
- **End-to-End Traceability**  
Tracks assets from manufacture to installation to retirement, creating a full lifecycle record for each serialized item.
- **Regulatory & Safety Compliance**  
Automates audit trails for installations, inspections, and material traceability—meeting requirements like PHMSA, EPA, and local codes.
- **Maintenance & Recall Efficiency**  
Supports rapid identification and isolation of recalled or degraded components in the field—minimizing service disruption.
- **Integration with GIS & Digital Twins**  
EPCIS complements utility GIS, SCADA, CMMS, and digital twin systems—offering structured event data and real-time synchronization.
- **Multi-Party Collaboration**  
Enables secure data sharing across manufacturers, contractors, regulators, and asset owners—each maintaining their own dynamic, instance-level EPCIS repository recording supply chain events.

# Why GTI Recommends Using GS1 Standards for Traceability of System Components

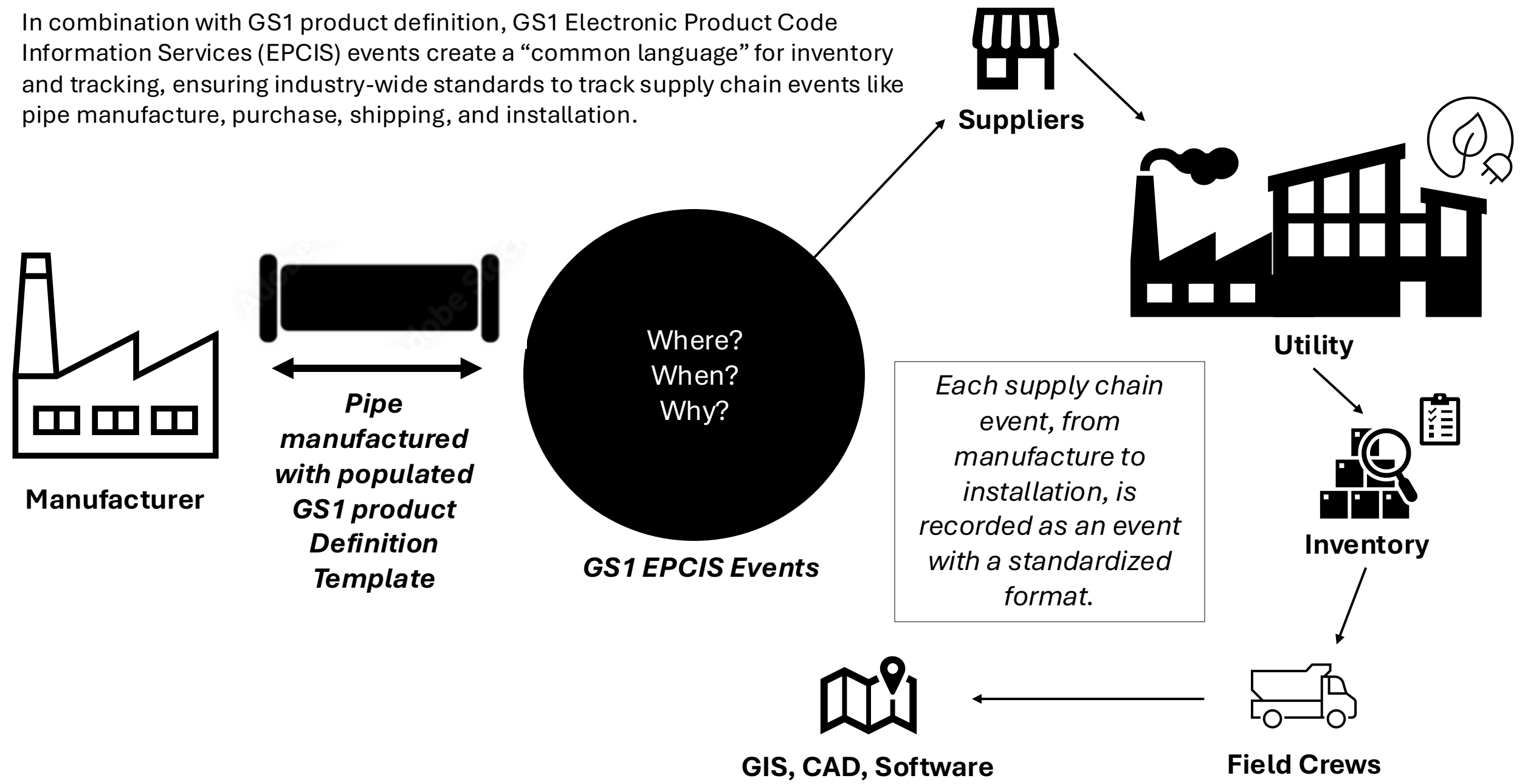


GS1 has been used successfully to identify products for decades without regard to how or where they are made.

- GS1 Standards and GS1 Services are non-proprietary.
- GS1 standards can be used to identify mono-material products and complex assemblies.
- GS1 Standards (revisions) are published annually and available in the public domain at no cost.
- GS1 Identification supports multiple business processes, including capital construction data, material management, engineering design, asset management, and maintenance.
- Mobile data collection and business systems can be supported across all utility classes (gas, electric, water, telecom).

# GS1 Tracking and Traceability: Pipe Manufacture

In combination with GS1 product definition, GS1 Electronic Product Code Information Services (EPCIS) events create a “common language” for inventory and tracking, ensuring industry-wide standards to track supply chain events like pipe manufacture, purchase, shipping, and installation.





# Field Traceability Pilot



## Enbridge Ohio Pilot\* (formally Dominion)

- 51 pcs of pipe and fittings
- 28 attributes on each component
- MTR associated on each piece collected
- GPS installation locations to within 1.5 cm (ends of each pipe) (vertical accuracy ~4 cm)
- All collected in 2.5 hours

Normally this process would take a couple of days.

This process, utilizing GS1, can achieve TVC efficiently with very little human interaction.

\*OTD-funded Projects

# Field Pilot using GS1 – Enbridge Ohio

## One Scan Documentation

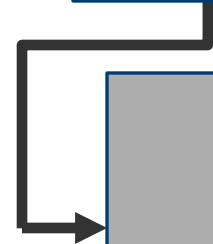
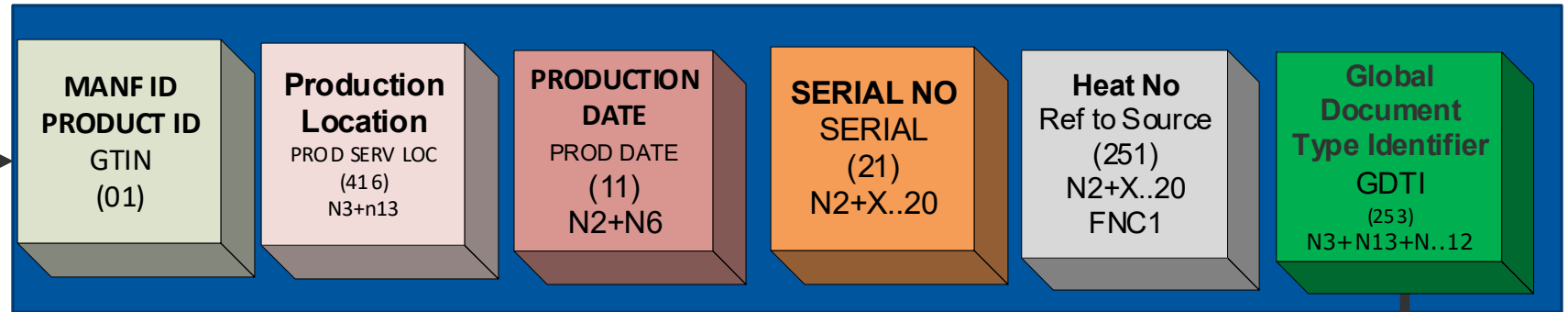
### No human intervention

- Precision location 1.5 CM accuracy
- 8 key track and traceability identification properties
- 20 attributes defining the component
- 14 Geospatial Quality control properties
- Complete digital Material Test Report by component
- Image-based Material Test Report (PDF)
- Integration with most GIS and CAD-based mapping systems (GeoJSON export)

# Field Pilot

## GS1 (Traceability) Barcode Identification Application Identifiers

- Each element in the barcode is standardized.
- Their arrangement is unimportant.
- A new element may be added or removed without consequence.



GDSN  
Global Data  
Synchronization Network  
Manufacturer Catalogue Data



JSON – Verifiable  
Credentials  
2023

Electronic Data Interchange  
X12 ANSI TS 863  
Material Test Reports



**Dominon of OHIO**  
**Project: PIR 2349 Norquest & Benton**  
**GS1 Standard Barcode**

**Joint #100**

Coil - Run - Pipe  
0063 - 063 - 22  
Length 29.8 Ft.  
Heat # 232796  
GTIN 00810007410166  
Questions about this label please call (330) 690-5119

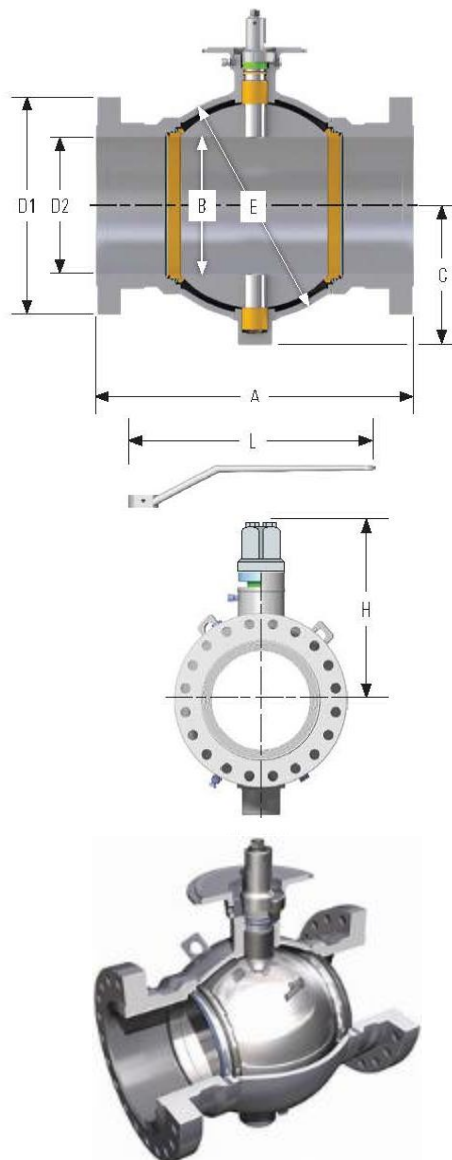
C:\Bartender Project Databases\Dominon Summer 2023\Barcode database and barcode template



# Typical Product Data Found in Product Catalogues

Register digital product data for each product

ASME Class 150 Ball Valve	
GTIN	810007410134
Size	20
ASME Pressure class	150
Operating temperatures	-50 to 250 degF
End connection	Flanged
Body style	Fully welded
Standard material	Forged carbon steel
Seat and seal	Tefzel™
Nom. Diameter	20 in
Ball Bore B	19.25 in
Stem Size	4.0 in
RF Length A	36 in
RTJ Length A	36.5 in
Diameter D1	27.5 in
Diameter D2	19.25 in
Diameter Handwheel for Gear G	18 in
C.L. to Handwheel C.L. H	27.75 in
Operator	Worm gear
Trim	131 NACE
Body Shell	ASTM A516 Gr70†
End connections	ASTM A350 LF2
Ball, stem, trunnion	ASTM A694 Gr F50
Seat rings	AISI 410 SS
Barrier rings	Carbon steel nickel plated
Delta seals	PTFE
Body to seat seal	PTFE
Seat ring insert	Nylon
Coating on ball, stem, trunnion	003 ENP
Service	Standard
Operating Pressures	150 - 2500
Weight	3310 lb



API 5L Pipe Attributes (GS1 Services)	
"GTIN"	"00810007410166",
ShortName	"Steel Pipe Size - 20 in - .375 in wall HFW X52M",
Serial	"005706305",
Nominal Inside Diameter	"19.625 Inches",
Nominal Outside Diameter	"20 Inches",
Gross Weight	"3147 Pound",
Net Weight	"78.67 Pound",
Depth	"40 Foot",
Height	"20 Inches",
Net Content	"1 Each",
Width	"20 Inches",
Wall Thickness	"0.375 Inches",
Brand Name	"American Steel Pipe ",
Pipe End	"Plain end ",
Type Of Construction	"HFW ",
Family	"Pipe ",
Category	"seam welded ",
Subcategory	"Pipe Streight ",
Grade	"X52 ",
Utility Component Type	"2 ",
Coating Type	"Fusion Bonded Epoxy ",
P S L	"2 ",
Delivered Condition	"M ",



# Field Pilot - Exported Data to ESRI\*



## Mobile Client Export Data

- ☐ Esri
- ☐ Autodesk
- ☐ Bentley Systems
- ☐ GE Small World

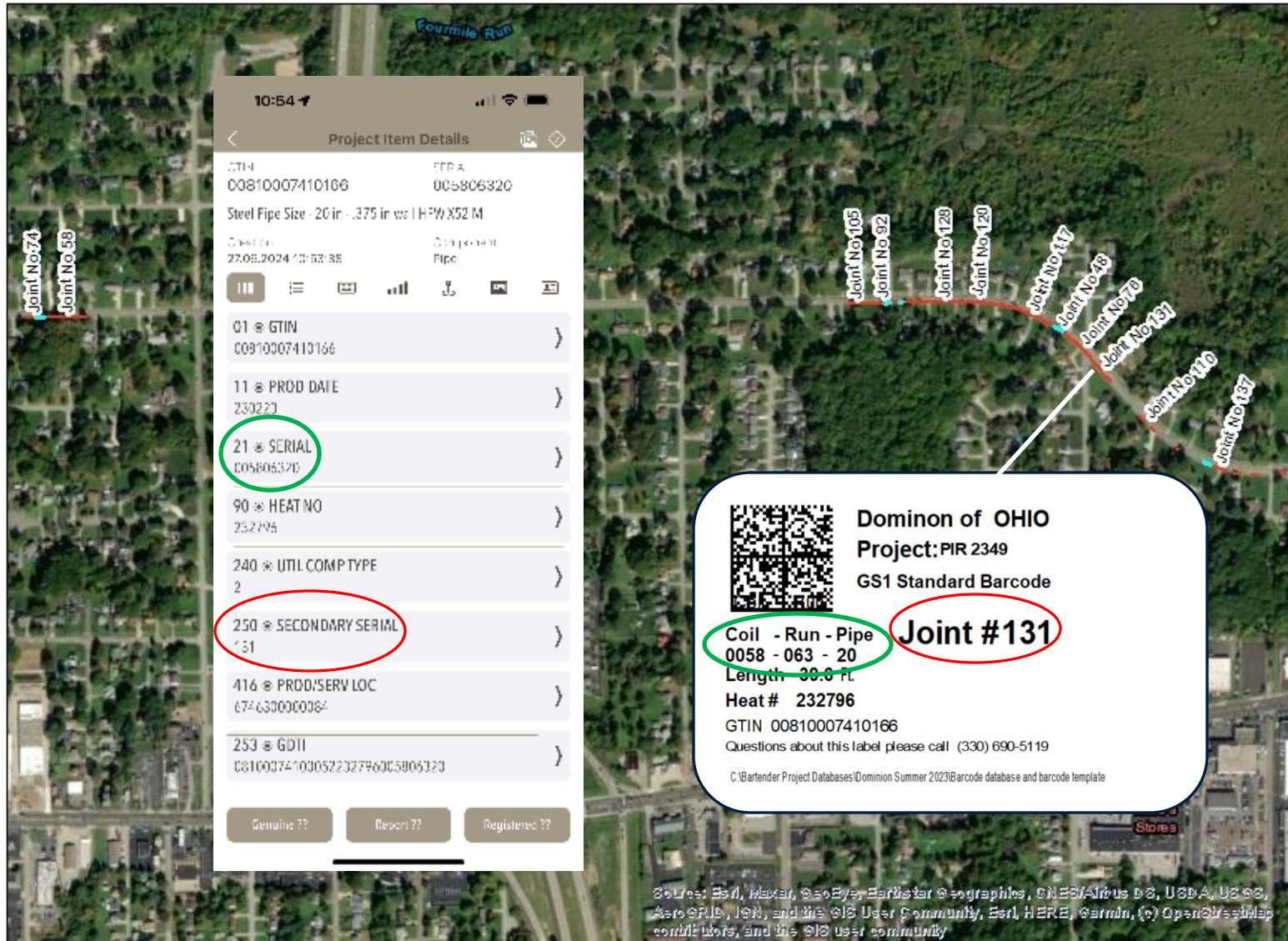


Norquest & Benton, Inc.

\* Data furnished  
by Enbridge Ohio



# Looking for a Pipe made from Coil #58?



**Project Item Details**

GTIN: 00810007410166  
 FIPA: 005806320  
 Steel Pipe Size - 20 in - .375 in wall HFW X52 M

Created: 27.08.2024 10:53:38  
 Component: Pipe

01 \* GTIN  
 00810007410166

11 \* PROD DATE  
 230223

21 \* SERIAL  
 005806320

90 \* HEAT NO  
 232795

240 \* UTIL COMPTYPE  
 2

250 \* SECONDARY SERIAL  
 131

416 \* PROD/SERV LOC  
 674630000084

253 \* GDII  
 08100074100652232796005806320

Buttons: Genuine ??, Report ??, Registered ??

**Map Labels:** Joint No 74, Joint No 58, Joint No 105, Joint No 92, Joint No 128, Joint No 120, Joint No 117, Joint No 48, Joint No 78, Joint No 131, Joint No 110, Joint No 137.

**Barcode Label:**

**Dominion of OHIO**  
 Project: PIR 2349  
 GS1 Standard Barcode

**Coil - Run - Pipe**  
 0058 - 063 - 20  
 Length - 30.0 ft  
 Heat # 232796  
 GTIN 00810007410166  
 Questions about this label please call (330) 690-5119

**Joint #131**

C:\Bartender Project Databases\Dominion Summer 2023\Barcode database and barcode template

Sources: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

NorquestBenton_JSONToFeature1		
GTIN	ShortName	Serial
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52M	005506312
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52M	5706305
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52M	005706315
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52M	005306306
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52M	005406313
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52M	003106323
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005806318
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005806307
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	006206306
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005406302
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005506306
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	006306312
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005506306
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	006306303
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	003106323
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	006106303
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	006006317
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005906312
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005806312
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	006306322
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005706320
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005606322
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	006306321
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	006306310
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	006306321
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	006306320
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005606320
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005906316
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005706321
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	004906311
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005006304
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005906305
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	004906311
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	004506309
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005406314
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005806320
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	5706305
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	5706305
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	004906311
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005906315
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	006506318
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005706321
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005506316
00810007410166	Steel Pipe Size - 20 in - .375 in wall HFW X52 M	005206302



# API RP 5MT Annex



## Barcode Information

## GS1 based Unique ID

API RP 5MT to include Annexes for Machine-readable traceability systems for line pipe.

## Product Information

Product data available from any GDSN compliant data pool

A01	00810007410166	Product ID (GTIN)
A11	230223	Date of Manufacturer
A21	005706305	Serial Number
A90	241719	Heat Number
A240	2	Component Type: Straight Pipe
A250	74	Customer Field Tracking No.
A416	6746300000084	Location of Manufacturer
A253	08100074100052241719005706305	Document Identifier (MTR Report)

Product Information (Data Pool)	
GS1 Services (GDSN)	
GTIN	00810007410166
ShortName	SteelPipe Size -20 in wall HFW X52M
NominalInsideDiam	19.625 in
NominalOutsideDiam	20 in
GrossWeight	3147 lb
NetWeight	78.67 lb
Depth	40 Ft
Height	20 in
NetContent	1 Each
Width	20 in
WallThickness	0.375 in
BrandName	American Best Pipe
PipeEnd	Plain end
TypeOfConstruction	HFW
Family	Pipe
Category	seamwelded
SubCategory	Pipe Straight
Grade	X52
UtilityComponentType	2
CoatingType	Fusion Bonded Epoxy
PSL	2
DeliveredCondition	M

# What's next? - Additional Field Demos

- Additional Field Demos are needed.
  - This will allow for implementation and feedback on the GS1 traceability methodology
  - It will assist with getting your manufacturers involved and to better understand the process of applying GS1 barcodes to their products.
  - This is the necessary next step to implementing a component traceability system to our industry – especially our steel components and assemblies.
- We need the entire industry to come together to make this happen!
- Please let me know if you are interested. We want to work with you and your component suppliers.



# Questions / Comments

GTI Energy develops innovative solutions that transform lives, economies, and the environment



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