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National Iranian Gas Co.

مدیریت پژوهش و فناوری

Research and Technology Management

امور تدوین استانداردها

Standardization Division

IGS

Iranian Gas Standards

Specification for :

مشخصات فنی :

Safety Shut-off Valves

شیر ایمنی قطع کننده

APPROVED

FOREWORD

This standard is intended to be mainly used by **NIGC** and contractors and has been prepared on interpretation of recognized standards , technical documents , knowledge ,backgrounds and experiences in gas industries at national and international levels.

Iranian Gas Standards (**IGS**) are prepared , reviewed and ammended by technical standard committees within NIGC Standardization Div. and submitted to the **NIGC's "STANDARDS COUNCIL"** for approval .

IGS Standards are subject to revision , amendment or withdrawal , if required , thus the latest edition of **IGS** shall be checked/inquired by **NIGC** users .

This standard must not be modified or altered by the end users within **NIGC** and her contractors. Any deviation from normative references and/or well known manufacturers specifications must be reported to Standardization div.

Any comments from concerned parties on **NIGC** distributed **IGS** are welcome to technical standards committees and will receive serious attention and consideration should a revision to standards is recommended .

GENERAL DEFINITIONS :

Throughout this standard the following definitions , where applicable , should be followed :

1- "**STANDARDIZATION DIV.**" has been organized to deal with all aspects of industrial standards in NIGC . Therefore , all queries for clarification or amendments are requested to be directed to the mentioned div.

2- "**COMPANY** " : refers to national iranian gas company .

3- "**SUPLIER**" : refers to a firm who will supply the service , equipment or material to igs specification whether as the prime producer or manufacturer or a trading firm .

4- "**SHALL**" : is used where a provision is mandatory.

5- "**SHOULD**" : is used where a provision is advised only.

6- "**MAY**" : is used where a provision is completely discretionary.

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پیشگفتار

- ۱- این استاندارد/دستورالعمل بمنظور استفاده اختصاصی در شرکت ملی گاز ایران و شرکتهای فرعی وابسته تهیه شده است.
- ۲- شرکت ملی گاز ایران در مورد نیازهای عمومی از استانداردهای وزارت نفت (IPS) و در مورد نیازهای اختصاصی از استانداردهای اختصاصی خود (IGS) استفاده می نماید.
- ۳- استانداردهای شرکت ملی گاز ایران (IGS) توسط کمیته های تخصصی استاندارد متشکل از کارشناسان بخش های مختلف و یا مشاور تهیه می شود و توسط شورای استاندارد (منتخب هیئت مدیره شرکت ملی گاز ایران) به تصویب میرسند.
- ۴- در تنظیم متن استانداردهای (IGS) از کلیه منابع شناخته شده استاندارد، اطلاعات فنی - تخصصی مربوط به صنایع گاز دنیا، مشخصات فنی تولیدات سازندگان معتبر جهانی و نیز از نتیجه تحقیقات و تجربیات کارشناسان و متخصصان داخلی بر حسب مورد استفاده می شود. همچنین بمنظور استفاده هر چه بیشتر از تولیدات داخلی قابلیت های سازندگان داخلی نیز مورد توجه قرار میگیرد.
- ۵- استانداردها از طریق پایگاه اینترنتی شرکت* و یالوح فشرده (CD) در اختیار واحدها و کاربران قرار می گیرد .
- ۶- استانداردها بطور متوسط هر ۵ سال یکبار و یادر صورت ضرورت زودتر، مورد بازنگری و بروزرسانی قرار میگیرند. بنابراین کاربران باید همیشه آخرین نگارش را مورد استفاده قرار دهند.
- ۷- هرگونه نظر و یا پیشنهاد اصلاح در مورد استانداردها مورد استقبال و بررسی قرار خواهد گرفت و در صورت تأیید، استاندارد مربوطه نیز مورد تجدیدنظر قرار خواهد گرفت .

تعاریف عمومی

در متن استانداردهای (IGS) از تعاریف و اصطلاحات زیر استفاده میشود.

- ۱- "شرکت" (COMPANY): منظور از شرکت "شرکت ملی گاز ایران" و یا شرکتهای فرعی وابسته میباشد.
- ۲- "فروشنده" (SUPPLIER/VENDOR): به فرد یا موسسه ای اطلاق میگردد که تعهدی رانسبت به شرکت تقبل نموده است.
- ۳- "خریدار" (PURCHASER): منظور از خریدار "شرکت ملی گاز ایران" و یا شرکتهای فرعی وابسته میباشد.
- ۴- "SHALL": در مواردی بکاربرده میشود که انجام خواسته مورد نظر اجباری است
- ۵- "SHOULD": در مواردی بکاربرده میشود که انجام خواسته مورد نظر ترجیحی و درعین حال اختیاری است
- ۶- "MAY": در مواردی بکاربرده میشود که انجام کار به شکل مورد بحث نیز قابل قبول میباشد

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1. SCOPE

THIS SPECIFICATION COVERS THE MINIMUM DESIGN , MATERIAL , FABRICATION , TESTING , MARKING AND PACKING REQUIREMENTS FOR SAFETY SHUT OFF VALVE . THE SHUT OFF VALVE IS INTENDED TO BE INSTALLED AT THE UPSTREAM OF THE METERING AND PRESSURE REDUCING STATION WHERE THE PRESSURE IS CONTROLLED BY MEANS OF REGULATOR AND THE SHUT OFF VALVE SHALL OPERATE IN CASE OF REGULATOR FAILURE . FOR SPECIFIC REQUIREMENTS SEE THE ATTACHED DATA SHEET OF THIS SPECIFICATION AND FOR GAS ANALYSIS SEE APPENDIX "A " .

IN CASE OF ANY DEVIATION FROM THIS SPECIFICATION IT SHALL BE CLEARLY STATED ON THE TECHNICAL QUOTATION SUBMITTED BY MANUFACTURER .

2. GENERAL REQUIREMENTS

2.1- SUPPLIER IS REQUIRED TO FILL OUT THE ATTACHED DATA SHEET AND SIGN IT AND SUBMIT 3 COPIES OF THE FOLLOWING DOCUMENTATION IN ENGLISH ALONG WITH TECHNICAL QUOTATIONS :

2.1.1- ALL TECHNICAL INFORMATION AND ORIGINAL PRINTED CATALOGUE (S) .

2.1.2- COMPLETE PARTS LIST CATALOGUE (S) AND RECOMMENDED SPARE PARTS LIST FOR COMMISSIONING AND TWO YEARS OPERATION . (WITH PRICE FOR FINANCIAL QUOTATION AND WITHOUT PRICE FOR TECHNICAL QUOTATION) .

2.1.3- GENERAL DRAWING (S) SHOWING OUTLINE DIMENSIONS AND THE DESCRIPTIVE SKETCH OF CONTROL UNIT .

2.1.4- FULL DESCRIPTION OF CONTROL SYSTEM OPERATION .

2.1.5- MANUALS FOR INSTALLATION , COMMISSIONING , OPERATION AND MAINTENANCE .

2.2- AFTER RECEIVING THE ORDER THE SUPPLIER SHALL SUBMIT ALL ABOVE INFORMATION (NO.OF COPIES ACCORDING TO DATA SHEET).

3. DESIGN & SERVICE CONDITIONS

THE SAFETY SHUT OFF VALVE SHALL HAVE EASY MOVING PARTS WITHOUT STRESSES & BE MADE OF QUALITY WITH FIRST CLASS WORKMANSHIP IN ORDER TO ATTAIN GAS TIGHTNESS , RELIABILITY AND UNATTENDED PERFORMANCE OVER A PERIOD OF TIME & OVER THE RANGE OF OPERATING CONDITIONS WITH MINIMUM MAINTENANCE . SUCH SHUT OFF VALVE SHALL HAVE THE GENERAL CHARACTERISTICS AS LISTED BELOW :

3.1- THE SHUT OFF VALVE SHALL BE WEATHER PROOF INSTALLED OUT OF DOORS WITHOUT ANY WEATHER PROTECTION AND THE AMBIENT TEMPERATURE RANGE -29°F TO + 60° C) (-20°F TO + 140°F) , OTHER CONDITIONS , IF ANY , SHALL BE SPECIFIED IN DATA SHEET .

3.2- THE SHUT OFF VALVE SHALL BE OF QUICK CLOSING & SLOW OPENING TYPE WITH ADJUSTABLE OPERATING TIME . THE MAXIMUM CLOSING TIME SHALL BE 5 SECONDS WHEN THE SHUT OFF VALVE SETTING IS REACHED .

3.3- THE SHUT OFF VALVE SHALL BE ACCOMMODATED WITH 5 MICRON CARTRIDGE TYPE DRY FILTER FOR INSTRUMENT AND POWER GAS .

3.4- THE SHUT OFF VALVE SHALL BE OF FAIL SAFE TYPE AND THE VALVE SHALL CLOSE UNDER SELF FAILURE CONDITION ,

FAILURE CONDITION MEANS FAILURE OF THE INSTRUMENT AIR OR GAS SUPPLY .

- 3.5- THE SHUT OFF VALVE SHALL BE MANUALLY RESETTABLE AND SHALL NOT RETURN TO THE OPEN POSITION SPONTANEOUSLY .**
- 3.6- THE SHUT OFF VALVE SHALL BE DESIGNED FOR OVER PRESSURE OF FOR OVER AND UNDER PRESSURE SHUT OFF AS SPECIFIED IN THE DATA SHEET .**
- 3.7- THE VALVE AND ACTUATOR SHALL BE IN THE FORM OF A SINGLE COMPLETE UNIT AND CAPABLE ENOUGH TO BE OPENED AND CLOSED MANUALLY BY MEANS OF HANDLE OR PUSH BUTTON IN EMERGENCY CASES .**
- 3.8- THE ACTUATOR SHALL BE DOUBLE ACTING , PNEUMATICALLY OPERATED BY POWER GAS PRESSURE AND SCOTCH YOKE TYPE AND CAPABLE ENOUGH TO PRODUCE THE MAXIMUM REQUIRED TORQUE TO OPERATE THE VALVE WITH MINIMUM INLET PRESSURE AS SPECIFIED IN DATA SHEET .**
- 3.9- THE MAIN VALVE SHALL BE A FULL BORE VALL VALVE , SPLIT BODY , FLANGED END ACCORDING TO N.I.G.C SPECIFICATION NO. IGS – MS – PL – 010 ATTACHED TO THIS STANDARD AS PER SIZE AND PRESSURE RATING SPECIFIED IN THE DATA SHEET .**
- 3.10- MANUALLY OPERATED ½ INCH BY PASS VALVE AND PIPING SHALL BE PROVIDED FOR PRESSURE EQUALIZATION PURPOSES ACROSS THE VALVE FOR 6 INCH AND LARGER SIZES .**

4. MATERIAL

- 4.1- THE MAIN VALVE MATERIAL SHALL BE ACCORDING TO N.I.G.C. SPECIFICATION NO. IGS-MS-PL-010 ATTACHED TO THIS STANDARD .**

4.2- THE MATERIAL OF ALL COMPONENTS OF ACTUATOR AND CONTROL UNIT SHALL BE SUITABLE FOR PRESSURE , TEMPERATURE AND OTHER OPERATING CONDITIONS SPECIFIED IN THE DATA SHEET .

4.3- ALL COMPONENTS OF THE ACTUATOR AND CONTROL UNIT SHALL BE FULLY RESISTANCE TO OR PROTECTED FROM HARMFUL EFFECTS OF THE CONSITUENTS OF THE GAS SPECIFIED IN APPENDIX " A" .

4.4- NON – METALIC PARTS SUCH AS DIAPHRAGMS SHALL BE MADE OF SYNTHETIC MATERIAL RESISTANT TO ODORIZED NATURAL GAS AND METHANOL .

DIAPHRAGM MATERIAL SHALL BE MADE OF NITRILE RUBBER REINFORCED WITH PROPER TISSUES .

OTHER NON – METALLIC PARTS MATERIAL SUCH AS " O " RINGS SHALL BE MADE OF VITON .

4.5- ALL TUBES AND SENSING LINES SHALL BE STAINLESS STEEL .

4.6- EXCEPT ACTUATOR'S BODY , OTHER METALIC PARTS SHALL NOT BE MADE OF CAST IRON .

4.7- SCOTCH YOKE MECHANISM AND PISTON RODS SHALL BE MADE OF FORGED CARBON STEEL ACCORDING TO ASTM A – 105 .

5. INSPECTION :

THE MAIN VALVE SHALL BE TESTED ACCORDING TO N.I.G.C SPECIFICATION NO.IGS-MS-PL-010 .

THE COMPLETELY ASSEMBLED SHUT OFF VALVE SHALL BE INSPECTED AND THE INSPECTION SHALL COVER THE FOLLOWING STAGES AS SPECIFIED IN THIS SPECIFICATION AND ACCORDING TO TERMS AND CONDITIONS OF PURCHASE ORDER AND APPROVED DRAWINGS .

AFTER REVIEWING DOCUMENTS INCLUDING TEST RESULT AND CERTIFICATES WHICH SHOULD HAVE BEEN DONE ON EACH INDIVIDUAL SHUT OFF VALVE BY MANUFACTURER , 5% OF EACH ITEM AND LOT (NOT LESS THAN ONE SAMPLE) READY FOR SHIPMENT SHALL BE SELECTED RANDOMLY BY N.I.G.C'S IDENTIFIED INSPECTOR TO CARRY OUT ALL THE INSPECTION & TESTS SPECIFIED IN THIS SPECIFICATION .

5.1- VISUAL INSPECTION :

VISUAL INSPECTION SHALL CONSIST OF CHECKING OF WORKMANSHIP , PAINTING , OVERAL DIMENSIONS , CONNECTIONS , TUBING , VALVES , INSTRUMENT ELEMENTS , INTERNAL PARTS , NAME PLATE , PACKING , ETC .

5.2- PERFORMANCE TEST :

5.2.1- WITH THE MINIMUM INLET PRESSURE FOLLOWING TEST AND CHECKING SHALL BE CARRIED OUT WITH ACCEPTABLE RESULTS :

5.2.1.1- OVER PRESSURE TEST AND UNDER PRESSURE TEST :

THE SHUT OFF VALVE SHALL BE ACTUATED AT SET PRESSURES SPECIFIED IN THE DATA SHEET . THE LOW AND / OR HIGH PRESSURESETTING RANGES SHALL REMAIN WITHIN THE REQUIRED LIMIT (S) , AND IF , WHEN APPLICABLE , ONE SETTING IS CHANGED THE OTHER SETTING SHALL NOT CHANGE MORE THAN 10% FOR LOW & 5% FOR HIGH PRESSURE .

5.2.1.2- RESET TEST :

THE SHUT OFF VALVE SHALL BE MANUALLY RESETABLE AND SHALL NOT SPONTANEOUSLY RETURN TO THE OPEN POSITION ONCE OPERATED .

5.2.1.3- PUSH BUTTON MANUAL TEST :

THE SHUT OFF VALVE SHALL CLOSE OR OPEN UPON OPERATING THE PUSH BOTTON / HANDLE .

5.2.2- SHUT OFF SET POINT REPEATABILITY TEST :

WHEN THE SHUT OFF VALVE SET RANDOMLY AT DIFFERENT POINTS BY VARYING THE SENSING PRESSURE FOR AT LEAST 10 TIMES , THE SHUT OFF POINTS SHALL BE READ . THE DIFFERENCE BETWEEN MINIMUM AND MAXIMUM DEVIATIONS TO READINGS SHALL NOT BE GREATER THAN 2% OF SET PRESSURE .

5.2.3- AMBIENT TEMPERATURE TEST :

5.2.3.1- THE SHUT OFF VALVE SHALL BE KEPT IN THE CLIMATIC CHAMBER HEATED LONG ENOUGH TO BE IN TEMPERATURE EQUILIBRIUM AT 60° C . AT THIS TEMPERATURE BY INCREASING / DECREASING THE SENSING PRESSURE TO SET POINT , THE SHUT OFF VALVE SHALL OPERATE WITHOUT OBJECTIONAL NOISE , MALFUNCTION , HUNTING , PULSATION OR CHATTERING .

5.2.3.2- SAME AS 5.2.3.1 BUT AT TEMPERATURE -29° C (-20° F) .

5.3- STRENGTH AND DURABILITY TEST :

5.3.1- THE SHUT OFF VALVE SHALL BE ACTUATED AT LEAST 20 TIMES SUCCESSIVELY AT SET PRESSURES . DURING AND AFTER THIS TEST , THE SHUT OFF VALVE SHALL OPERATE WITHOUT MALFUNCTION AND ANY DISINTERGRADATION .

5.3.2- THE METALIC PARTS OF ACTUATOR SUBJECT TO CORROSION AND RUSTING SUCH AS SPRINGS ,

WASHERS , RODS , STEMS , PISTON SHALL BE MADE OF CORROSSION RESISTANT MATERIAL OR PLATED PROPERLY SO THAT THEY CAN PASS THE SALT SPRAY TEST FOR 500 HOURS IN ACCORDANCE WITH ASTM B117 .

5.4- PAINT TEST :

PAINING OF THE SHUT OFF VALVE SHALL BE CHECKED AS FOLLOWS :

5.4.1- THE COLOUR OF PAINT SHALL BE GREY ACCORDING TO REQUIREMENTS MENTIONED IN " PREPARATION & PAINTING " SECTION .

5.4.2- THICKNESS :

THICKNESS OF PAINT SHALL BE MEASURED AT FIVE DIFFERENT POINTS . NONE OF EACH INDIVIDUAL POINT SHALL HAVE NOT LESS THAN 100 MICRONS FOR STEEL PARTS AND NOT LESS THAN 50 MICRONS FOR OTHER METALLIC PARTS SUCH AS ALUMINIUM . THE DIFFERENCE BETWEEN MINIMUM & MAXIMUM MEASURED THICKNESS ON EACH LOT OF VALVES SHALL NOT EXCEED 20% OF THE AVERAGE THICKNESS .

5.4.3- PAINT ADHESION :

THE TEST SHALL BE CARRIED OUT IN ACCORDANCE WITH BS 3900 PART E6 EQUIVALENT TO ISO 2409 . THE CROSS - CUT AREA SHALL NOT BE DISTINCTLY GREATER THAN 5% (CLASSIFICATION 1) .

6. PREPARATION & PAINTING :

ALL METAL SURFACES SHALL BE PROPERLY PREPARED AND CLEANED TO ALLOW PROPER SUBSEQUENT TREATMENT AND PAINTING . ANY PARTS OF THE SHUT OFF VALVE CONSISTING OF DIE CAST

ALUMINIUM THAT COULD BE EXPOSED TO THE ATMOSPHERE SHALL RECEIVE A CHROMATE CONVERSION COATING .

THE EXTERIOR SURFACE OF THE SHUT OFF VALVE SHALL HAVE AN ENAMEL COATING WITH A MINIMUM DRY THICKNESS OF 50 MICRONS . STEEL PARTS OF SHUT OFF VALVE SHALL BE PAINTED WITH ORGANICZINC RICH SYSTEM ACCORDING TO BS 5493 REFERENCE NO. SD5 , WITH MINIMUM TOTAL THICKNESS OF 100 MICRONS . PAINT SPECIFICATION SHALL BE IN ACCORDANCE WITH REFERENCE 100 DF OF BS 5493 AND GREY COLOUR ACCORDING TO BS 381 C – NO. 631 FOR FINAL COLOUR .

7. MARKING

7.1- THE MAIN VLAVE SHALL BE MARKED ACCORDING TO N.I.G.C SPECIFICATION NO.IGS – MS – PL – 010 .

7.2- EACH SHUT OFF VALVE SHALL BEAR ON ITS BODY A STAINLESS STEEL OR ALUMINIUM NAME PLATE (S) PERMANENTLY MECHANICAL ATTACHED THERETO WITH THE FOLLOWING INFORMATION :

7.2.1- MANUFACTURER'S NAME OR TRADE MARK .

7.2.2- MANUFACTURER'S SERIAL NUMBER , TYPE AND MODEL NUMBER .

7.2.3- YEAR OF MANUFACTURE .

7.2.4- N.I.G.C PURCHASE ORDER AND ITEM NUMBER .

7.2.5- MAXIMUM WORKING PRESSURE BAR (PSI) .

7.2.6- SHUT OFF OVER PRESSURE AND / UNDER PRESSURE RANGE BAR (PSI)

7.2.7- SHUT OFF SET POINT BAR (PSI)

7.2.8- INLET / OUTLET CONNECTION SIZES & RATING .

THESE INFORMATION MUST BE IN ENGLISH , VISIBLE , LEGIBLE AND INDELIBLE UNDER THE NORMAL CONDITIONS OF APPLICATION .

8. PACKING :

PACKING SHALL BE IN ACCORDANCE WITH N.I.G.C INSTRUCTIONS FOR PROTECTION , PACKING , MARKING AND DISPATCHING .

9. GUARANTEE :

- 9.1- MANUFACTURER SHALL GUARANTEE THE COMPLIANCE OF MATERIAL AND PERFORMANCE OF THE SUPPLIED EQUIPMENTS WITH THIS SPECIFICATION .
- 9.2- THE GUARANTEE PERIOD SHALL BE ONE YEAR AFTER EQUIPMENTS GOES ON STREAM OR EIGHTEEN MONTHS FROM DATE OF SHIPMENT , WHICHEVER OCCURS FIRST .
- 9.3- SUPPLIER SHALL AGREE TO REPAIR ON SITE OR REPLACE ANY PART , EQUIPMENT OR UNIT WHICH PROVES TO BE DEFECTIVE DURING THE ABOVE MENTIONED PERIOD FREE OF CHARGE .

APPENDIX " A " GAS COMPOSITION

CONTENT	RANGE (%)
METHANE	85.21 – 98.72
ETHANE	0.563 – 9.76
PROPANE	0.066 – 3.38
I – BUTANE	0.017 – 0.32
N – BUTANE	0.034 – 0.61
I – PENTANE	0.018 – 0.13
N – PENTANE	0.020 – 0.09
N – HEXANE	0.04 – 0.14
CARBON DIOXIDE	MAX 0.3
HYDROGEN SULFIDE	MAX 5 PPM
NITROGEN	MAX 5
SPECIFIC GRAVITY	0.563 – 0.655
WATER CONTENT (LBS / MMSCF)	MAX 8
MERCAPTANE	MAX 20 PPM
METHANOL	AS REQUIRED IN WINTER INJECTION

APPENDIX " B"
SAFETY SHUT OFF VALVE DATA SHEET

	TO BE FILLED BY N.I.G.C	TO BE FILLED BY SUPPLIER
DESCRIPTION	PROCUREMENTAL INFORMATION	PROJECT NO. :
	INQUIRY NO. :	QUOTATION NO. : QUOTATION DATE :
	ITEM NO. :	SHUT OFF VALVE TYPE , MODEL :
	QUANTITY REQUIRED :	QUANTITY OFFERED :

		TO BE FILLED BY N.I.G.C	TO BE FILLED BY SUPPLIER
SERVICE & DESIGN CONDITION	WERKING PRESSURE	MIN. BAR (..... PSI) MAX BAR (..... PSI)	MIN. BAR (..... PSI) MAX BAR (..... PSI)
	SHUT OFF OVER PRESSURE RANGE BAR (..... PSI) BAR (..... PSI)
	SHUT OFF UNDER PRESSURE RANGE BAR (..... PSI) BAR (..... PSI)
	SHUT OFF OVER PRESSURE SET POINT BAR (..... PSI) BAR (..... PSI)

	SHUT OFF UNDER PRESSURE SET POINT BAR (..... PSI) BAR (..... PSI)
	GAS TEMPERATURE	MIN. ° C (..... ° F) MAX. ° C (..... ° F)	MIN. ° C (..... ° F) MAX. ° C (..... ° F)
	TYPE OF INSTALLATION	OUTDOOR INSTALLATION	YES NO.
	MAXIMUM SUN TEMPERATURE	80 °C (176 °F)	YES NO.
	MAXIMUM RELATIVE HUMIDITY	% 90	YES NO

		TO BE FILLED BY N.I.G.C	TO BE FILLED BY SUPPLIER
CONNECTION	TYPE	FLANGED END	YES NO
	STANDARD	ANSI B 16.5	YES NO
	FLANGE RATING	ANSI CL 150 ANSI CL 300 ANSI CL 600	ANSI CL 150 ANSI CL 300 ANSI CL 600
	TYPE OF FACING	RAISED FACE , SERRATED FINISH	YES NO
	SIZE : INLET / OUTLET x INCH x INCH

DOCUMENTATION	REQUIRED DOCUMENTS (REF . CLAUSE 2.2) SET (S)	YES	NO
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MANUFACTURER SIGNATURE & STAMP