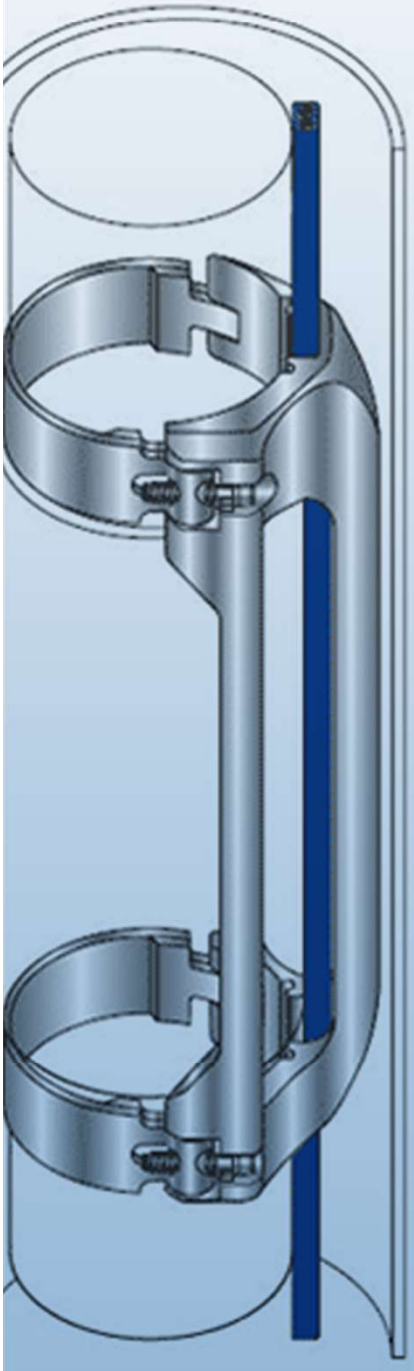
GRADWELL OILFIELD PRIVATE LIMITED

Safety, Excellence & Quality with Integrity



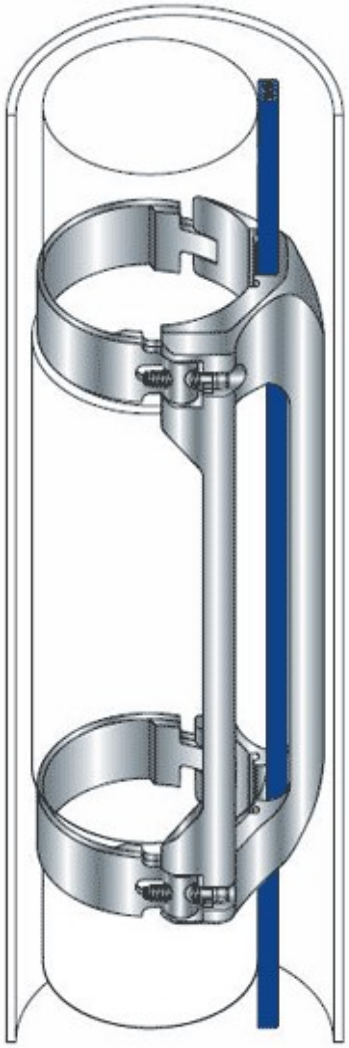
PRODUCT CATALOUGE

CROSS COUPLING CABLE PROTECTOR

CASING ACCESSORIES | COMPLETION EQUIPMENT | LINER HANGER SYSTEM

Description

Gradwell cable protectors are used to protect any configuration of ESP cables, control lines, encapsulated bundles, and etc in wellbore. Protectors use channels to prevent control lines or cables when assembly through tubing coupling. during completion service.



Features

- ✓ All metal cross coupling construction to NACE specification MR01-75/95 for sour gas service.
- ✓ Improved cable guard ‘stand off’ to minimize potential for damage due to crushing.
- ✓ Improved contouring of leading edges to ‘deflect’ away from potential hang up situations.
- ✓ Alignment of cap screw head with protective rib to substantially increase wear protection for the vulnerable cap screws.
- ✓ Interlocking action between clamping arm and casting body to eliminate potential shear stresses on the cap screws.
- ✓ Low profile clamping arm shielded from hang up by coupling offset and casting body.
- ✓ One-piece assembly with no loose fittings to fall downhole.
- ✓ Pre-engaged fasteners throughout the range for fast and reliable installation to reduce rig time required.
- ✓ Totally retrievable and re-usable with the minimum of refurbishment.

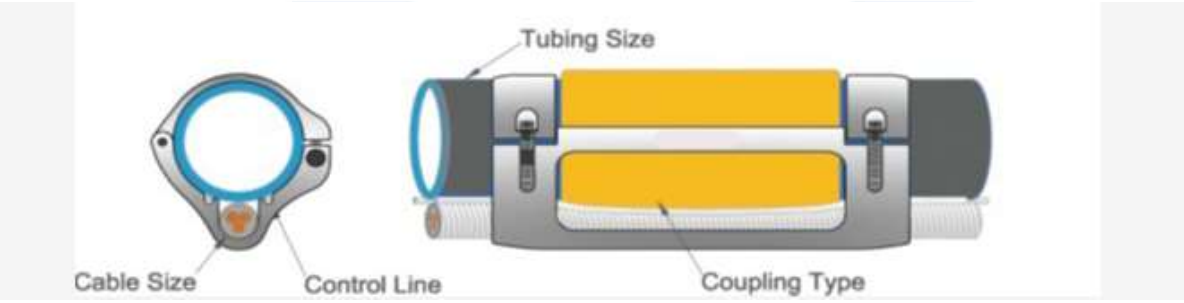
Application

- ✓ Artificial lift
- ✓ Permanent Gauges
- ✓ Intelligent Wells
- ✓ Chemical Injection
- ✓ Fiber Optics
- ✓ Safety Valves
- ✓ Geo Phones

Manufacturing Range

Cast Steel Cross Coupling Cable Protectors for tubing sizes 2-7/8" , 3-1/2" and 4-1/2" with EUE, VAM Top and other premium tubing connections for both round and flat cable configurations:

Tubing Size	ESP Cable Size	Control Line Slots	Tubing connection
2-7/8"	# 1, #2, #4, #6 - Flat or Round	1/4 or 3/8 or 0.43	API and Premium
3-1/2"	# 1, #2, #4, #6 - Flat or Round	1/4 or 3/8 or 0.43	API and Premium
4-1/2"	# 1, #2, #4, #6 - Flat or Round	1/4 or 3/8 or 0.43	API and Premium



We also offer various other metallurgy options including stainless steel and nickel chromium steel based on specific customer requirements. Other sizes with different tubing, cable and control line configurations could also be made available on specific customer request.

Casting Cable Protectors

2 7/8” EUE

2-7/8” All Cast Cross Coupling Protector designed to straddle AMS coupling. To support and protect Round Cables #1 & #2 and 3/8” & 1/4” capillary line.

3 1/2” EUE

3-1/2" All Cast Cross Coupling Protector designed to straddle EUE coupling. To support and protect Flat Cables #2 and 3/8” & 1/4” capillary line.

3 1/2” NEW VAM

3-1/2" All Cast Cross Coupling Protector designed to straddle NEW VAM coupling. To support and protect Flat Cables #2 and 2x ESP Cable 11 x 11 mm and 1/4” capillary line.

3 ½” VAM TOP

3-1/2" All Cast Cross Coupling Protector designed to straddle Vam Top coupling. To support and protect Flat Cables #4 and 2 x 1/4” capillary line.

4 1/2” EUE

4-1/2" All Cast Cross Coupling Protector designed to straddle EUE coupling. To support and protect Flat Cables # 2 and 3/8” & 1/4” capillary line.

4 ½” NEW VAM

4-1/2" All Cast Cross Coupling Protector designed to straddle New Vam coupling. To support and protect Round Cables #4 and 2 x 1/4” capillary line.

Casting Cable Protectors

4 1/2” FOX

4-1/2" All Cast Cross Coupling Protector designed to straddle FOX coupling. To support and protect 2 x Round Cables #4

4 1/2” NEW VAM

4-1/2" All Cast Cross Coupling Protector designed to straddle New Vam coupling. To support and protect Flat Cables #4 and 3/8” & 1/4” capillary line.

4 1/2” VAM TOP

4-1/2" All Cast Cross Coupling Protector designed to straddle Vam Top coupling. To support and protect Round Cables #1 and 2 x 1/4” capillary line.

4 1/2” NUE

4-1/2" All Cast Cross Coupling Protector designed to straddle NUE coupling. To support and protect Flat Cables #4 and 3/8” & 1/4” capillary line.

Metallurgy

Cross Coupling Cable Protector clamps manufactured from Carbon Steel ASTM A216 grade WCB complete with pre-engaged swing bolt locking mechanism and hinge pin manufactured from ASTM A193 grade B7M

ASTM A216 Grade WCB Material specification
Chemical Composition Requirements:

C%	Mn%	Si%	P%	S%
0.30 Max	1.0 Max	0.60 Max	0.04 Max	0.045 Max

Heat Treatment: Normalizing

Mechanical Properties Requirements:

YS in MPa	UTS in MPa	Elongation	Hardness
250 Min	485 Min	22% Min	22 HRC Max

ASTM A193 Grade B7M
Chemical Composition Requirements:

C%	Mn%	P%	S%	Si%	Mo%	Cr%
0.37-0.49	0.65-1.10	0.035 Max.	0.040 Max	0.15-035	0.15-0.25	0.75-1.20

Heat Treatment: - Quenching & Tempering.

YS in MPa	UTS in MPa	Elongation	Hardness
552 Min	690 Min	50% Min	22 HRC Max

Inspection and Testing

Each Cross-Coupling Cable protector manufactured by Gradwell undergoes following tests before leaving the facility to ensure conformity to design, protector acceptance criteria and operational parameters.

MATERIAL CHEMISTRY

Material chemistry of each casting heat lot is tested to ensure its conformity to predetermined material grades and the results are recorded and communicated to customer in the form of MTCs.

MECHANICAL PROPERTIES

Test coupons/pieces prepared from each casting lot undergoes mechanical testing at Gradwell's in-house lab to confirm its compliance to predetermined mechanical properties of material and the results are recorded and communicated to customer in the form of MTCs.

ASSEMBLY TRIAL

Cable Protectors from each manufacturing lot are selected random and tested to ensure safe and secure assembly across production tubing and tubing coupling. This test is done using a properly machined mandrel to the sizes of tubing and coupling.

DRIFT TEST

Assembled cable protectors are drift tested to ensure that the protectors will pass thru within the specified drift id of Well Casing while installing them during the well completion.

CABLE SLIPPAGE TEST

In-house cable slippage test is conducted on Cast Steel Cross Coupling Cable protectors to ensure minimum support criteria for cable without causing damage to the cable. Each Protector is designed to carry a load equal to the weight of 100 ft of cable, without damaging the cable. Test frequency and test results from each lot is recorded and communicated to customers.

Inspection and Testing

LATERAL LOAD TEST

Gradwell's Cable protectors are designed to withstand 20 Tons of lateral load and this shall be verified by conducting a lateral load test on cable protectors by placing the protector properly between specially designed fixtures attached to UTM while gradual load is applied on the product.

Once the load is removed, tested protectors are closely inspected for cracks, major deformation and any failures in the hinge and lock areas.

AXIAL LOAD TEST

Gradwell's Cable protectors are designed to withstand 30 Tons of axial load and this shall be verified by conducting an axial load test on cable protectors by placing the protector properly between specially designed fixtures attached to UTM while gradual load is applied on the protector.

Once the load is removed, tested protectors are closely inspected for cracks, major deformation etc.

Specialized Clamps and Control Line Protectors

Gradwell also offers a range of specialized clamps and control line protectors including mid joint control line protectors and MLE Clamps. Our protectors are bespoke designed to ensure that all tensile and compressive forces are absorbed by the protectors and the control line is not subjected to any excessive force whereby these specially designed protectors totally eliminates damage to control lines or encapsulated lines. Field installation is quick and simple using pneumatic wrenches.

MLE Clamps

MLE Clamps are designed to hold and support the Motor Lead Extension cable at the assembly neck of the ESP components. These clamps are manufactured from high quality castings of carbon steel/high grade stainless steel using investment casting by lost wax method. Gradwell's MLE clamp is designed to uniquely grip and protect the MLE and control lines for down hole sensors and chemical injections lines. It also offers superior protection for the pot head connection and are engineered to suit various combinations of ESP completions with diverse MLE configurations