

# SERIE INTEGRAL

Fully Motorized

Rockwell, Superficial Rockwell,  
Brinell, Vickers, Knoop, Shore

Test loads from 1 to 3000 kgf



Motorized turret 8 positions

# INTEGRAL

## MOTORIZED MEASURING HEAD

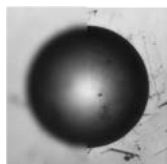
The INTEGRAL hardness testers is a fully motorized system for automatic preloading, loading and measurements. AFFRI® System hardness testers achieve the highest level of depth accuracy and measurement resolution available. Thanks to the AFFRI® System, the real indentation measurement is guaranteed without any external interference in any condition.

## ONE BUTTON MEASUREMENTS

Just push the start button and the head moves down performing the hardness test cycle in automatic succession without breaching a phase:

1. Automatic contact with the specimen
2. Automatic active sliding clamping
3. Automatic preloading and loading
4. Automatic switching to optic lens
5. Autofocus by image scanning brightness
6. Automatic measure
7. Automatic return stroke at programmed distance

The entire test cycle is complete and the result appears on a large display.



The Auto Focus performs an automatic focus adjustment for the selected optic with precise positioning at any magnification by mean of real image scanning brightness. This system assures high reading accuracy and reduces reading time.



**!** Fully motorized and automatic, the test is not affected by operator influences and can easily be used by operators of every level.

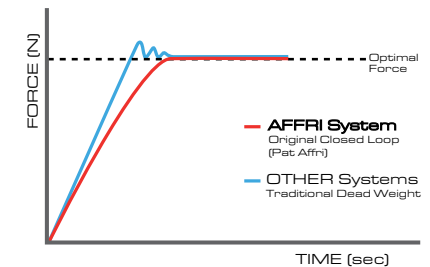


## MOTORIZED VERTICAL STROKE 500 mm / 20"

Fully motorized adjustable testing stand up to 500 mm / 20" vertical capacity including automatic contact with test surface from every distance with single start input (As option up to 700 mm / 28"). The activation of the test cycle is automatic, it starts when the head makes contact with the specimen which is automatically recognized at any position within the vertical stroke.

## LOAD CELL AND CLOSED LOOP

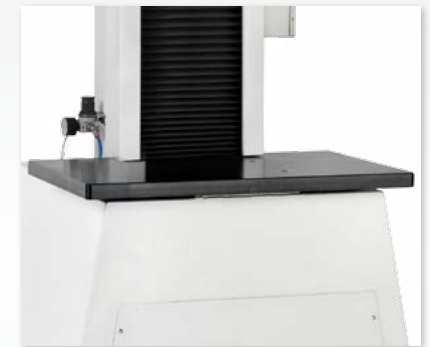
Load forces are applied through load cells and electronically controlled in "Closed Loop" (Pat. AFFRI) with a frequency of 1 kHz. Each load force is automatically programmed and controlled assuring perfect linearity in every range eliminating the problems associated with traditional dead weight system testers. Results are not affected by any structural deflection, misalignment or external vibration. Accurate measurements, even on the first test, eliminate the need for multiple tests. There is no need to perform a second test, the first one is absolutely precise. The R&R (repeatability and reproducibility) data is at the top of its class.



**THE FIRST TEST RESULT IS CORRECT AND ABSOLUTE, SAVING TIME AND MONEY, THUS INCREASING OUTPUT AND PRODUCTIVITY**

## LARGE BASE

The INTEGRAL wide work table is capable of bearing masses up to 3000 kg which allows for steady hardness measurements on bulky or irregular pieces which cannot be easily received by the regular bench hardness tester. Also, it offers a comfortable wide working table for small pieces.



# INTEGRAL

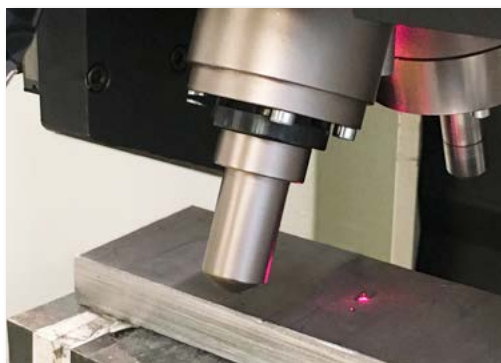
## 7 SLOTS MOTORIZED ROTATING TURRET

Automatic and pneumatic turret for multi objectives and multi indenters up to 7 positions rotating in front of the machine for 360° including milling surface preparation tool. Motorized rotating head with multiples indenters for different hardness test methods. Multiple optics for a perfect image zoom quality on different indent diameters. After the indentation the turret automatically switch to the right optic auto-centering the indentation.



**MILLING TOOL**

Automatic milling tool for oxidation removing and surface preparation before indenting. Programmable milling thickness for fully automatic process.



**CLAMPING PROTECTION**

Secure specimen clamping from milling to the entire measuring cycle. Laser mirror pointing.



## SWIVELLING PNEUMATIC TURRET

Automatic and pneumatic turret with 1 indenter and one interchangeable objective as standard. Each tool can be easily changed with manual screwing. Auto-rotating, auto-tool-switching and auto-centring for a completely automatic single or multi indentation measurement cycle.

The swivelling turret is the standard system for Integral machines. The 7 position rotating turret is upon request.







## OPEN SPACE

The easy handling arm supporting the touch panel assures wide space to accept large parts. Heavy and large samples can be easily placed using a forklift or overhead-traveling crane.



# INTEGRAL

## ANY TEST POINT

The Integral hardness tester can reach any testing position from really small area like cutting tools to the inside of holes or tubes. The indenter length or geometry can be customized on different needs. Indenter's extension assures easy testing on difficult test areas with high accuracy. The indenter is always protected and the measure is always accurate.



## CLAMPING SYSTEM

Secure contact with the specimen is always maintained, even in the unlikely event of any specimen movement during the operation cycle.

Sliding clamping piece for 500 mm for constant pressure programmable by air compressed power. The clamping system moves with the head for the whole vertical stroke generating a constant pressure when the specimen is clamped.

**The clamping system assures perfect stability of any test piece throughout the test cycle. No additional accessories are required.**



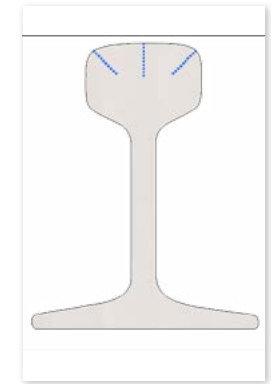
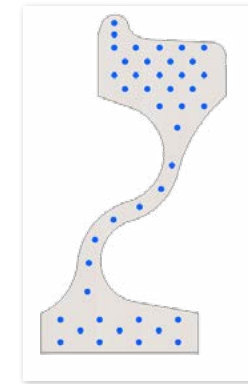


#### PROTECTIVE STRUCTURE

Ergonomic working station with transparent walls protection box for secure test cycles. The protection is also available with open front panel with photocell column.

## FULLY AUTOMATIC MULTI-INDENTATION CYCLES

Reference points for indentation patterns can be positioned precisely where they are required. The table allows automatic multi-indentation test cycles and CHD on multiple samples with perfect positioning on the entire area, no matter the indentations amount. Everything is automated, freeing users for other tasks and minimizing subjectivity associated with human intervention.



#### XY MOTORIZED STAGE

Motorized X-Y axis table 200 x 100mm division 0.01 mm combined to automatic start test cycle for hardness case depth. Supported weight 3000kg. (Other dimensions at request)

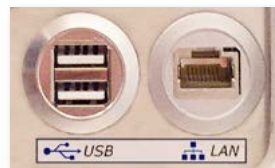


# INTEGRAL THE SOFTWARE

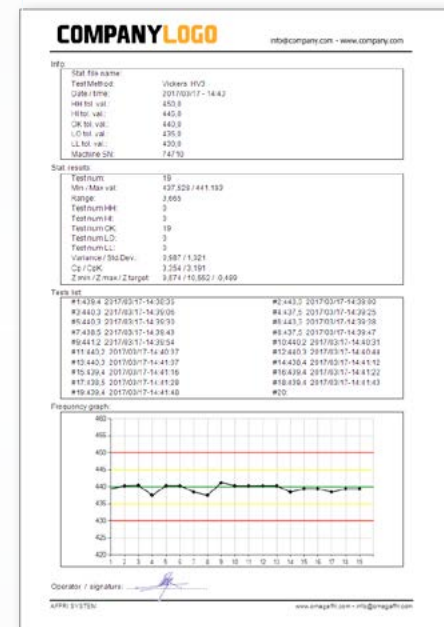
The INTEGRAL measuring software has been studied to fulfill any client need and to be accessible to every operator. This is a "SMART SOFTWARE" which results extremely easy to be used and can be customized to display only needed testing procedures.



- IP64 Touchscreen
- Visual control of results according to tolerances and indent dimensions.
- Direct conversion in HR, HB, HK and any other hardness scale.
- Print results from template or save/import tests cycles from archive.
- Easy joystick and buttons control.
- Large capacity Hard Disk and PC assure infinite performance as well as remote control for easy assistance everywhere.
- USB and LAN outputs. Connect to database networks, PC's and printers, to download data or for final custom reports.



Customizable test report with client logo, specimen information, statistics and graphs or export as CSV file.



## TEST DATA IMPORT AND EXPORT

Data enter via code bar scanning. Test cycles or sample drawings can be loaded directly from a central system by means of a bar code scanner. This hardness tester gets all informations fully automatically. After test run the bar code datas are added with results and immediatelly returned to the order management system. File import and export is configurable freely and therfor adaptable individually.

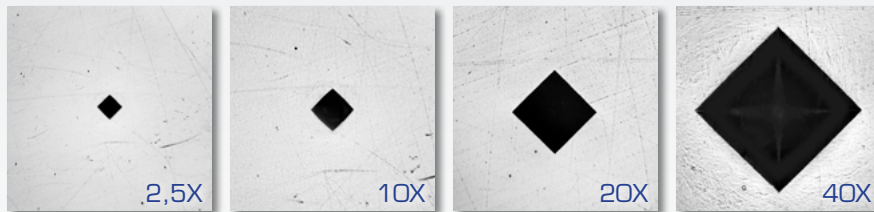




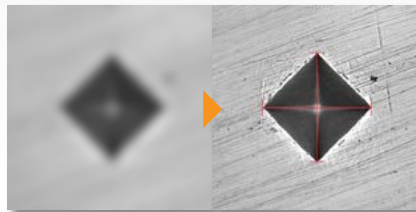
## SMART SOFTWARE MAIN FEATURES

### REAL MAGNIFICATION

Thanks to the motorized turret with multi-objectives, different lenses can be selected with a simple click. Digital magnification zoom is also available.

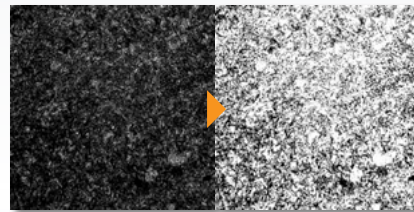


**AUTOFOCUS** - Motorized focus is always at the right linear quote.



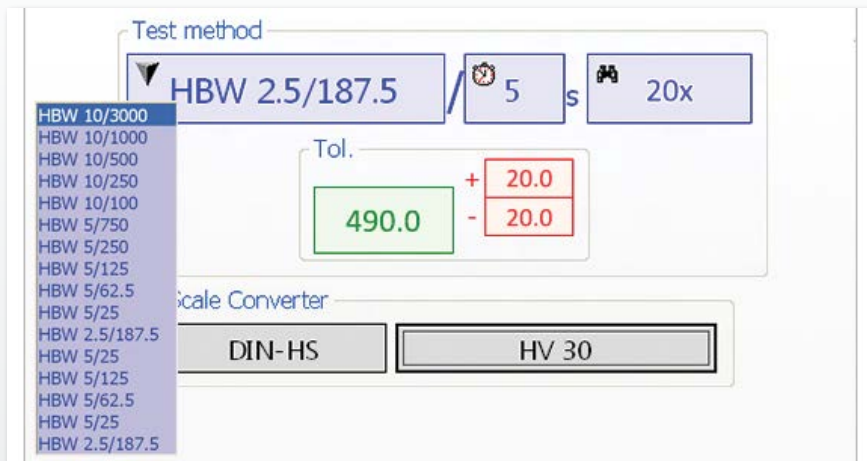
### AUTO-LIGHTING

Automatic light regulation on any surface.



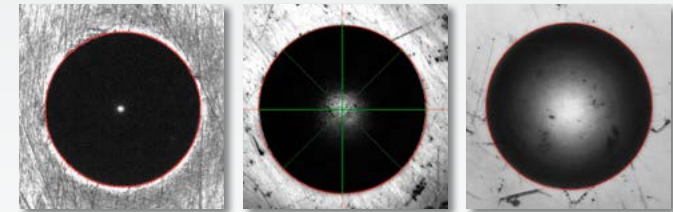
### TEST METHOD SELECTION

Only one window for the selection of everything you need for the test.



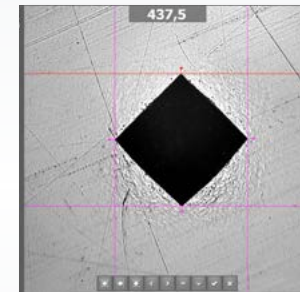
### AUTO MEASURE ON CRITICAL SURFACES

From perfectly polished to rough & etched samples, the software will automatically measure indents on any sample surface.



### MANUAL MEASURE

Manual indent evaluation.

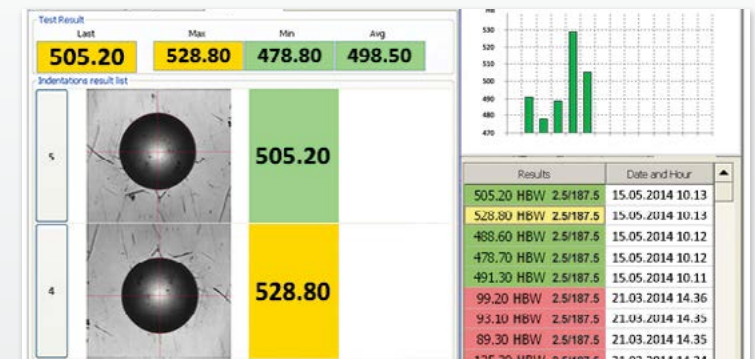


**TOOLS** - Check if the installed tool is correct for the selected hardness scale.

After Hardness		
GO / Slot	Installed	Required
1	Pyramid 136°	Ball 2.5 mm
2	0.4x / F25	
3	1.5x / F25	
4	20x	
5	Ball 5 mm	

### DYNAMIC RESULTS

Color highlighted results and live statistics. Watch result list and edit or modify single tests. Print results from template or save and import tests cycles from archive.



## ANVILS INTEGRAL

A013.0.000 - Fix anvil support  
 A014.0.001 - Flat anvil  $\varnothing 60$ mm  
 A014.0.002 - Flat anvil  $\varnothing 150$ mm  
 A014.0.003 - V face anvil  $\varnothing 60$ mm for diameters from 8 to 220mm  
 A014.0.004 - Double Spot anvil  $\varnothing 25$ mm flat + V for diameters from 5 to 30 mm  
 A009.0.005 - V Support H 50mm  
 A009.0.006 - V Support H 100 mm  
 A014.0.005 - Ball Anvil reclining self aligning  
 A014.0.006 - Diamond spot anvil for thinplate

### EXTRA ACCESSORIES

022.0.3.009 - Fix Clamping piece  
 A049.1.001 - Adjustable vice from 0 to 50mm  
 A009.0.001 - Manual table 100x100mm with 10 $\mu$ m step  
 A.000.0.CNC - CNC control system to program X Y table movement  
 A017.4.001 - Self identify the border of test sample trough optic system vision  
 A022.0.002 - AUTO START command trough pedal for series tests  
 A115.1.002 - Automatic start cycle connectable to PLC control  
 A055.0.001 - Motorized stage 300x200mm. Range 200x100mm div. 0,5  $\mu$ m  
 A055.0.002 - Motorized stage 150x150mm. Range 100x60mm. Div.0,5 $\mu$ /step  
 A095.0.001 - Objective 1x (6 mm). HB 25 to 3000 Kg, ball 10mm and 5mm  
 A095.0.002 - Objective 2x (3 mm) HB 6,25 to 187,5 Kg, ball 2.5mm - HV50, HV100  
 A095.0.004 - Objective 5x (1,2 mm) HB 2 to 30 Kg, ball 1mm - HV20, HV30  
 A095.0.008 - Objective 10x (0,5 mm) HV5 and HV10

### TEST BLOCKS

600.0.0.003 - HBW 2.5/62.5  
 601.0.0.005 - HBW 2.5/187.5  
 600.0.0.001 - HBW 5/125  
 600.0.0.010 - HBW 5/250  
 600.0.0.009 - HBW 5/750  
 600.0.0.008 - HBW 10/250  
 600.0.0.007 - HBW 10/500  
 600.0.0.006 - HBW 10/1000  
 600.0.0.005 - HBW 10/1500  
 600.0.0.004 - HBW 10/3000  
 602.0.0.003 - HV10  
 602.0.0.004 - HV30  
 601.0.0.001 - HRA  
 601.0.0.002 - HRB  
 601.0.0.003 - HRC  
 601.0.0.004 - HRD  
 601.0.0.010 - HR15N  
 601.0.0.011 - HR30N  
 601.0.0.012 - HR45N  
 601.0.0.020 - HR15T  
 601.0.0.021 - HR30T  
 601.0.0.022 - HR45T

### INDENTERS

033.0.2.550 - Diamond 120° HR  
 033.0.2.551 - Diamond 136° HV  
 033.0.2.553 - Ball W  $\varnothing 1$ mm  
 033.0.2.554 - Ball W  $\varnothing 2.5$ mm  
 033.0.2.555 - Ball W  $\varnothing 5$ mm  
 033.0.2.556 - Ball W  $\varnothing 10$ mm  
 033.0.2.552 - Ball W  $\varnothing 1/16$ "  
 033.0.2.557 - Ball W  $\varnothing 1/8$ "  
 033.0.2.558 - Ball W  $\varnothing 1/4$ "  
 033.0.2.559 - Ball W  $\varnothing 1/2$ "



## ACCESSORIES

Affri provides a large variety of accessories to fulfil any purpose of test. Customized solution based on client needs can be made for perfect tests on rough pieces. A series of different anvils is available to test every size of test piece. Variety of accessories to facilitate testing on small or oddly shaped items. Large variety of high quality indenters with certificate. Ball, cone, tungsten or diamond indenters for each hardness scale Rockwell, Vickers, Brinell, Knoop and Shore. Test blocks for the hardness tester periodic calibration with UKAS/ACCREDIA certificate, for any hardness scale and value.

All AFFRI accessories are customizable according to customers specifications, depending on dimensions and geometry of the samples and finished products.

## REAL TIME SUPPORT

Real Time Support. Connect your hardness tester to Internet, so that we can remotely diagnose any technical issue, provide additional operator training and update software version.

Connect to [www.affri.com](http://www.affri.com) for more details.



## INTEGRAL SOLUTIONS:



### MAXIINTEGRAL XY

on cylinders and bottles.  
Built-in programmable milling.



### INTEGRAL SPRINGS

on cylinders and bottles.  
Built-in programmable milling.



### MAXIINTEGRAL

on cylinders and bottles.  
Built-in programmable milling.



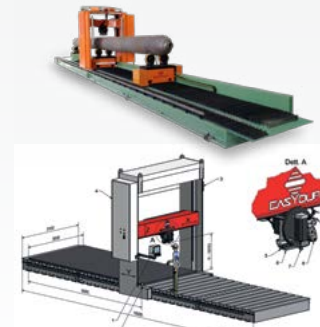
### INTEGRAL BOTTLE

Brinell up to 3000kgf. Fully automatic multi-indentation cycles on cylinders and bottles. Built-in programmable milling.



### EASYFLAG:

Rockwell and Brinell up to 3000kgf - Fully automatic with no limit of weight and dimension of the sample. Built-in programmable milling.



### PORTALE:

CNC portal for Brinell tests up to 3000kgf, 14 m, 4 axes with programmable milling included and automatic test cycle with image analysis.



Milling



Indenting



Reading

# INTEGRAL

**INTEGRAL1:** Brinell DIN EN ISO 6506 / ASTM E-10 from **15.6 to 3000 kgf**.

**INTEGRAL2:** Rockwell, Brinell, Vickers DIN EN ISO 6506 6507 6508 / ASTM E-10 E-18 E-384 from **1 to 250 kgf**

**INTEGRAL3:** Rockwell, Brinell, Vickers DIN EN ISO 6506 6507 6508 / ASTM E-10 E-18 E-384 from **3 to 1000 kgf**

**INTEGRAL5:** Rockwell, Brinell, Vickers DIN EN ISO 6506 6507 6508 / ASTM E-10 E-18 E-384 from **10 to 3000 kgf**



## FORCE RANGE

Rockwell / Superficial R.:	Preload: 29.4 - 98.1 N (3 - 10 kgf) / Rockwell: 588.4 - 980.7 - 1471 N (60 - 100 - 150 kgf) / Superficial Rockwell: 147.1 - 294.2 - 441.3 N (15 - 30 - 45 kgf)
Brinell:	9.807 - 24.52 - 49.03 - 61.29 - 98.07 - 153.2 - 245.2 - 294.2 - 306.5 - 612.9 - 1226 - 1839 - 2452 - 4903 - 7355 - 9870 - 29421N (1 - 2.5 - 5 - 6.25 - 10 - 15.625 - 25 - 30 - 31.2 - 62.5 - 125 - 187.5 - 250 - 500 - 750 - 1000 - 3000kg)
Vickers/Knoop:	9.807 - 29.42 - 49.03 - 98.07 - 147.1 - 196 - 294.2 - 490.35 - 980.7 N (1 - 3 - 5 - 10 - 15 - 20 - 30 - 50 - 100 kgf)
Optional tests:	<b>Test loads can be extended from 0,3 kgf when using the 7 position motorized turret.</b> 49 - 132 - 358 - 961 N (for plastic and rubber as per EN-ISO 2039)

## FEASIBLE TESTS - Depending on the models

Rockwell:	HRA - HRB - HRC - HRD - HRE - HRF - HRG - HRH - HRK - HRL - HRM - HRP - HRR - HRS - HRV
Superficial Rockwell:	HR15N - HR30N - HR45N - HR15T - HR30T - HR45T - HR15S - HR30S - HR45S - HR15W - HR30W - HR45W - HR15X - HR30X - HR45X - HR15Y - HR30Y - HR45Y
Brinell HBW:	1/1 - 1/2.5 - 1/5 - 1/10 - 1/30 - 2.5/6.25 - 2.5/15.625 - 2.5/31.25 - 2.5/62.5 - 2.5/187.5 - 5/25 - 5/31.25 - 5/62.5 - 5/125 - 5/250 - 5/750 - 10/100 - 10/125 - 10/250 - 10/500 - 10/1000 - 10/1500 - 10/3000
Brinell HBTW:	1/30 - 2.5/15.6 - 2.5/31.5 - 5/125(3) (Aluminum and its alloys) - 2.5/62.5(2) (Aluminum and its alloys) - 2.5/187.5(6) (Aluminum and its alloys) - 2.5/187.5(5) (Carbon steel) - 2.5/187.5(1) (Cast iron) - 5/125 - 5/250 - 5/750 - 10/500 - 10/1000 - 10/1500 - 10/3000
Vickers/Knoop:	HV 1 - HV 2 - HV 3 - HV 5 - HV 10 - HV 20 - HV 30 - HV 50 - HV 100
CHD:	Automatic Case depth measure with non-destructive process HDT method tracing case depth curve. Range till 1.5 mm / 0.06"
Temperature:	Measure range from - 40.0 to + 80.0 °C
Optional:	ISO 2039, Shore A and D hardness scales for plastic

## TECHNICAL DATA

Conformity Standards:	EN-ISO 6506-2 / EN-ISO 6507-2 / EN-ISO 6508-2 / EN-ISO 2039 / ISO 868 / ASTM-E10 / ASTM-E18 / ASTM-E103 / ASTM 2240 / ASTM-E384 / JIS
Accuracy:	Better than 0.5 %
Head Stroke:	Fully motorized 500mm / 20"
Height / Depth Capacity:	Height: 500 mm / 20" (As option can be extended) - Depth: 170 mm / 6.5" (As option can be extended)
Tolerable Weight:	2000kg
Turret:	Motorized and pneumatic automatic turret. Self-switching 1 indenter + 1 objective (optional 5-7 steps)
Camera / Lighting:	Firewire included / LED
Temperature Range:	From 10 °C to 35 °C
Power supply / Data Output:	110 or 220 V / 50÷60 Hz - Pneumatic Air - RS 232 C (USB as option)
Software:	Affri - Easydur
Principle of Operation:	Load Cell and Closed Loop (Affri patent)
Fields Of Use	For all metals: iron, steel, tempered steel, cast iron, brass, aluminum, copper and metal alloys. Heat treatment, hardening, nitriding, cementation and hardfacing. Hard and soft plastics.
Packing:	160 x 130 x 230 cm / 62 x 51 x 90" - 600kg



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