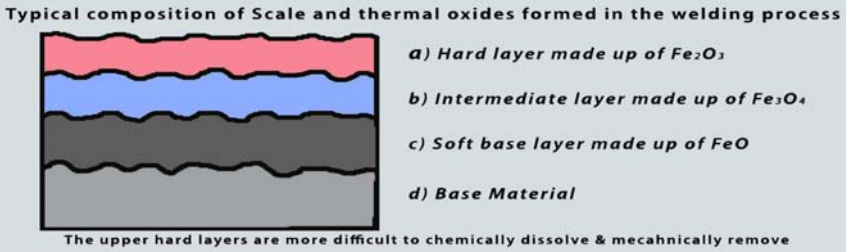
PRODUCT DATA SHEET

Thermal Oxides & Weld Scale

The thermal oxides on stainless steel from any heat treatment process and welding are mainly complexed iron oxides. They will readily corrode and in almost every application contaminate product media. The removal of these oxides is paramount to ensure that the surface properties and corrosion resistance is maintained.



The cladding on this column showed signs of corrosion shortly after installation due to ferritic contamination

Ferritic Contamination

Severe grinding techniques can embed ferritic contamination leading to the uppers layers corroding. Hardened carbon steel is employed on most machine tools to manipulate the raw material and airborne ferritic particle dust can be embed in the surface which subsequently leads to light surface corrosion with undesirable aesthetics.

Welded assemblies before and after immersion pickling

Pickling & Descaling Methods

TIG Welded pipe with clear to see thermal oxides present

The thermal oxides produced in the methods of heat treatment and welding may be removed in a number of techniques including:-

Mechanically
Whilst this method often looks to be effective, ferritic particles are removed by the mechanical abrasive tools employed often recontaminate by the nature of this method, leading to surface corrosion at a later stage.

Electro Chemically
These methods are usually employed on automatic production lines or where the use of toxic chemistry is prohibited. Anodic Etch 95 is effectively employed for this process and further details provided in the Willowchem Technology electrolyte data sheets.

Chemically
Chemical methods are the most common methods employed and are an effective way in which these oxides are removed.

Chemical pickling leaves a uniform matt surface, free of any ferritic contaminants.

Willowchem Chemical Pickling Products

All Willowchem Pickling products are capable of effectively removing most weld scales and thermal oxides, suitable for processing small and large areas of components manufactured from austenitic chrome-nickel-molybdenum steel. Typically each product dissolves a thin layer of surface material (~1 – 3 um) leaving a clean and matt uniform appearance.

Pickle Gel 50

Supplied in 2 kg Tubs, ready for easy application by brush or roller

Pickle Spray Gel 55

Supplied in 25 kg drums for processing larger areas and applied with a pneumatically actuated spray device.

Product features include:

- ***Effective removal of thermal oxides and weld scale.***
- ***New gel technology, reduces additives required in the formulation, leading to lower manufacturing costs.***
- ***Non drying formula, enabling pickling to be carried out over long periods, without drying or staining.***
- ***Formula has excellent water solubility and is easily rinsed, without staining.***
- ***Excellent pretreatment process prior to electropolishing.***

Applications & Process Parameters

Application Time: Typically 10 – 30 minutes
(Depending on the degree of scale and ambient temperature)

Note: Product efficiency is greatly depleted at temperatures below 10º C.

Pickle Solution 80

A full strength immersion pickling solution capable of removing the most severe weld scales and thermal oxides.

Pickle Solution 81 (Inhibited)

A solution with additives which inhibited surface attack, reducing the etching effect and fumes from the process tank.

Applications & Process Parameters

Supplied in 25 kg drums or 1000 kg IBC's as a concentrate to be mixed 1:1 with water. Typical immersion times of a between 1 – 4 hours

Equipment :- The immersion process is carried out in plastic fabricated tanks and fume extraction recommended.

Pretreatment :- Components should be free of grease and heavy soil before pickling. Pre-Cleaning may be carried out by immersion in diluted solution of Cleaner 60 or alternatively Willowchem Cleaner 61.

Post Treatment:- On completion of the process components should be thoroughly rinsed with clean fresh water, preferably through a high pressure spray device to remove the dissolved scale. If further treatment is necessary, reapply or immerse as required.

Passivation / Desmuting:- In order to obtain full corrosion resistance, stainless steel surfaces that have been cleaned and require no further treatment should undergo a final desmuting, passivation and ideally a sanitation step. Willowchem BioPass is ideal for this operation, a non hazardous, multifunctional desmut, passivation and biocide. No final rinsing necessary, as the solution breaks down into harmless biodegradable by-products. Alternatively, traditional solutions are available such as Willowchem 70, a Nitric acid based passivator or the Sulphuric based product Willowchem 71. Both 70 & 71 are concentrates that require dilution 1:1 with water.

Safety Precautions & Environmental Issues

Willowchem Pickling Products are a mixture of acids and additives. Great care must be taken when handling the products and particular attention must be given to existing official safety regulations and current legislation. Personal protective clothing (apron, gloves and goggles) must be worn at all times when handling the product. The MSDS, Health & Safety data sheet applicable to the product must be read in conjunction with this operating data sheet.

The waste waters produced from rinsing are acidic and should be neutralised. The waste rinse waters may only be passed through a drainage system with the appropriate approvals and discharge licenses, obtainable from the local water authority. Alternatively, the rinse waters should be stored and removed by a licensed waste contractor.

Under current European Legislation the "Pickling of Stainless Steel" is a prescribed process and may require licensing by the local authority, especially if carried out on a large scale. It is advisable to contact the local environmental agency office prior to the use.

Surface Finishing Product Range

PRODUCT	APPLICATION	METHOD
CLEANER	**RANGE**	
Cleaner 60	**A concentrated highly efficient stainless steel cleaning product that may be applied by spray and diluted for use in immersion processes.**	**Solution maybe applied by pump action hand spray of used dilute in an immersion application.**
Cleaner 61	**A low classification "Irritant" stainless steel cleaner with high cleaning power.**	**Applied by spray by 1000 ml trigger sprays or pump action spray device.**
PICKLE	**RANGE**	
Pickle Gel 50 & 55	**A universal clear pickle gel, capable of efficiently removing all types of thermal oxides and weld discolouration**	**Brush or roller on, 15 – 30 minutes application**
Pickle Solution 80	**A full strength pickling solution capable of combating the most difficult and stubborn thermal oxides and weld scales.**	**Mixed 1:1 with water and for immersion and enclosed spray processing only**
Pickle Solution 81 (Inhibited)	**An inhibited pickle solution that lowers the fume evolution and stabilises the process on initial application**	**Mixed 1:1 with water and for immersion and enclosed spray processing only**
ELECTROPOLISH	**RANGE**	
Electrolyte 90	**A highly efficient universal electrolyte capable of processing a wide range of stainless steel alloys.**	**For electrolytic processing in accordance with the product data sheet.**
Electrolyte 91 Medical Grade	**Similar to that of Willowchem 90 but with the added factor of first fill solution only contain high grade stainless steel metal in solution and the product is supplied with full certification of analysis and conformity.**	**For electrolytic processing in accordance with the product data sheet.**
First Fill 90 & 91F	**For first filling of tank the electropolishing products require metal in solution and therefore may be supplied precondition and ready for use.**	**For use when starting up a new electropolishing installation.**
High Specific Gravity 90 & 91 HGS	**Due to the hygroscopic nature of the electrolyte (Absorbs water for the atmosphere) Willowchem HGS may be added to a working solution in order to maintain the specific gravity within the limits detailed in the data sheets.**	**For use as additions on an electropolishing installation to increase the specific gravity.**
Anodic Etch 95	**An electrolytic non toxic pickling alternative highly effective electrolyte capable of processing a wide range of stainless steels.**	**For electrolytic processing in accordance with the product data sheet.**
PASSIVATION	**RANGE**	
BioPass	**A multipurpose Desmut, Passivation Sanitiser. Non Hazardous & Biodegrade.**	**Applied by spray by 1000 ml trigger sprays or pump action spray device.**
Passivation 70	Nitric acid based concentrate to making up solutions inline with ASTM A697	**Usually mixed 1:1 with water for immersion or spray application.**
Desmut 71	Sulphuric acid based product for rapid desmutting following pickling or electropolishing	**Usually mixed 1:1 with water for immersion or spray application.**

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Stainless Steel Surface Finishing, Products & Consumables, Plant / Equipment & Consultation